# STEEL

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*For forty-eight years—IRON TRADE REVIEW*

ABP

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NRA MEMBER U.S. WE DO OUR PART


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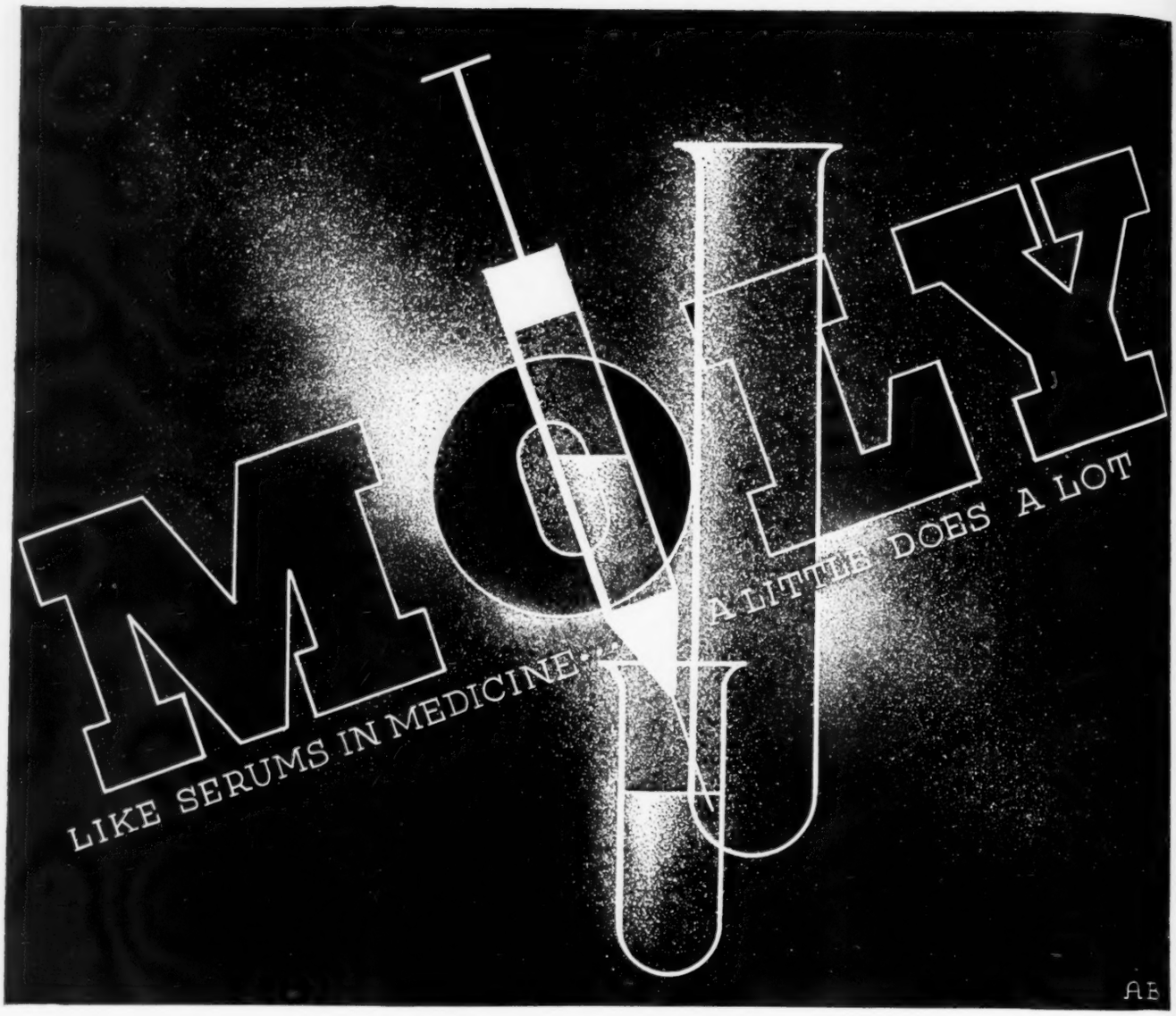


NOT only does a small addition of Molybdenum increase the strength and toughness of irons and steels, but it also builds up a stronger resistance to metal "diseases." . . . Corrosion, for instance:

For many years, a maker of large steam turbines had been using steel containing 12/15% Chromium for several of the turbine parts requiring superior corrosion-resistance. One difficulty encountered in this steel was its tendency at times to show a "wormy" finish on the forgings after pickling.

The addition of .50% Molybdenum has completely eliminated this trouble, saving the user far more than the additional cost of the "Moly" required. Furthermore, the Molybdenum serves to remove the tendency toward temper embrittlement that is occasionally encountered in this type of steel.

Molybdenum is a versatile alloy. It actually intensifies the desirable characteristics of other alloys. It contributes greater tensile and creep strength, wear-resistance; makes machining and welding easier. In fact, new analyses — combinations of "Moly" and other alloys — are constantly leading to further developments . . . which is one of the reasons for our having begun the publication of a house-organ, "*The Moly Matrix.*" It aims to help executives and engineers keep up to date with the progress of this extraordinary element. A request puts you on our mailing-list. An added request brings you either or both of these new books: "*Molybdenum in* 1934" and "*Molybdenum in Cast Iron* — 1934 *Supplement*"; while the Climax metallurgists and experimental laboratories in Detroit offer willing assistance toward the solution of your alloy problems. Climax Molybdenum Company, 295 Madison Ave., New York.

**CLIMAX Mo-lyb-den-um**

# As the Editor Views the News

THE statement issued Wednesday by the American Iron and Steel institute showing employment and wage conditions reported by 35 steel companies during the first 12 months of operation under the steel code furnishes abundant food for thought. The fact that wages increased $95,000,000 and average hourly rates mounted from 47.3 to 63.5 cents per hour certainly is gratifying from the standpoint of the NRA objective of increasing wages and employment, but what does it imply from the long range viewpoint of national recovery? Are we to believe that progressively shorter hours with higher unit wages constitute the key to the restoration of good times?

• • •

**30-Hour Week Up Again**

As an emergency measure the minimum wage-maximum hour legislation probably was justified, but today higher wages should be considered the hoped-for result of returning prosperity and not the cause of it. This should be obvious to everyone, yet it is said on good authority that the next congress will surely consider legislation for a blanket 30-hour week and that it is likely to pass. Administration spokesmen, however, appear to be hedging on their original attitude. Apparently they recognize the evil of blanket laws on hours. We may yet see the administration lined up with industry against congress on this issue.

• • •

**Who Will Curb Radicals?**

This leads directly to the interesting conjecture as to how the conservative and radical forces will line up this winter. The question is complicated by the ascendancy of local radicals such as Sinclair and Bilbo. President Roosevelt may be faced with the necessity of turning against them, after having encouraged some of them, at the same time he is engaged in trying to restrain a wild congress. If this situation materializes, industry will be on the President's side, although industry's sympathy for his plight will be tempered by the knowledge that much of the radical strength—local and national—was created by the early thoughtless utterances of the President and his brain trust. Industry will be battling these radical forces for years to come.

• • •

**Hands Across The Seal**

Four score of European delegates to the Fifth International Foundry congress (p. 17) have been touring industrial cities during the past week. Representatives from Belgium, England, France, Germany, Italy and Spain are in the party. The first international congress for foundrymen was held in Paris in 1923, the second in Detroit in 1926, the third in London in 1929, and the fourth in Paris in 1932. We believe the foundrymen have achieved greater success in promoting international relations than any other group in the iron, steel and metalworking industries. . . . . Exhibits at this year's Dairy Industries show (p. 56) again reflect the important role played by modern materials in this field. The interest of the producers of stainless steels in this market is more pronounced in this year's exhibits than in previous shows.

• • •

**Grain Size Is Timely Topic**

Developing as intricate a product as a voting machine from the blueprint or model stage to the point of successful manufacture on a production basis embraces (p. 29) a wide range of problems. The mere statement that materials for 17,000 parts had to be chosen and that methods for 150 subassemblies and 13 major assemblies had to be worked out gives an idea of the complications involved. It is the ingenuity for organizing for mass production, as illustrated in the case of these voting machines, which has made this country pre-eminent in manufacturing . . . . Interest in the grain size of metals runs high among metallurgists. This was demonstrated at the recent convention of the American Society for Metals (p. 34) when a symposium on grain size attracted a record breaking attendance.

E. L. Shaner

# Code Wage Bill $95,000,000; Labor Wins in Bargaining

NINETY-FIVE million dollars was the cost of the steel code in additional wages paid to iron and steel employes in the first year of the code, from August, 1933, to September, 1934, according to a survey made by the American Iron and Steel institute.

The actual cost of code administration and the time and traveling expenses of executives are additional. The former amounts to some hundreds of thousands of dollars per year.

### Three Pay Boosts

During this period, a total of $470,000,000 went into pay envelopes of iron and steel employes. Three wage advances have been granted since the code took effect on Aug. 19, 1933. The first averaging 16½ per cent was in August, 1933, a second came in November through adjustment of working hours, and the third in April, 1934, when a horizontal increase of 10 per cent was made effective.

Present hourly wage rates of steel workers now average 63.5 cents, or an increase of 34 per cent over the average of 47.3 cents in June, 1933.

The institute last week also announced the reseult of a survey of the labor situation in iron and steel as it affects company representation plans for collective bargaining. This survey covers the year from July 1, 1933, to June 30, 1934, and has developed these facts:

### Back Employe Plans

Eighty-six per cent of employes stand by employe representation plans for collective bargaining, assuming that voting in representation plan elections is approval of this form of collective bargaining.

A total of 12,709 separate cases came before representatives elected by these employes, of which 12,046 were settled and 663 are pending.

Out of 12,046 cases settled, 71.1 per cent resulted in a favorable decision to employes, 1965 to the management, 823 cases were compromised and 695 were withdrawn.

Participating in this survey were 35 companies operating 159 plants and employing 319,105 persons.

## A Year of Collective Bargaining in Iron, Steel

**July 1, 1933, to June 30, 1934**

| | |
|---|---|
| Number of companies furnishing data | 35 |
| Number of plants operated by these companies | 159 |
| Total employes covered by survey | 319,105 |
| Employes supporting plan* | 86% |
| Number of meetings held | 5,791 |
| Number of cases discussed | 12,709 |
| **Subject of cases** | |
| Working conditions | 7,389 or 58.2% |
| Wages | 3,713 or 29.2% |
| Safety | 1,607 or 12.6% |
| Number of cases settled | 12,046 |
| In favor of employes | 8,563 or 71.1% |
| In favor of management | 1,965 or 16.3% |
| Compromised | 823 or 6.8% |
| Withdrawn | 695 or 5.8% |
| Number of cases pending | 663 |

*Indicated by the number of employes voting under employes' representation plan at the last election in each plant during the period surveyed.

## Institute Backs Steel-Frame House

AMERICAN Iron and Steel institute is supporting agitation for greater use of steel in houses, which is visualized in Washington as offering a large outlet for steel and perhaps laying the groundwork for a new industry to lead the country out of depression.

A statement by the institute last week citing the advantages of steel frames for houses is believed to be the first effort by the institute to develop or broaden demand for steel. It reinforces the contention in the Windows of Washington department of STEEL in the issues of Sept. 24, Oct. 15, and again this week that co-operation with the federal housing administration would be beneficial.

The institute's complete statement follows:

Steel's history as a building material reverses that of stone and wood, which were first used in small structures, then later in larger ones. Steel, on the contrary, made its debut in the early skyscrapers, giants in their day.

This historic tie-up with skyscrapers has to some extent reacted against steel as a structural material for private residences. For some time, the public could not realize that the very material which makes skyscrapers possible holds great advantages for a 5-room house.

The public is being taught steel's advantages, however, and now that the steel framed house is no longer a designer's dream or an experiment in engineering, home builders are seriously considering steel framing.

Steel framed houses of every size and description have been built in this country, to the great satisfaction of architects, builders, and owners.

Architects like the greater freedom of design which a strong structural material makes possible. Builders like steel frames because they do not shrink or warp, causing plaster cracks and other like troubles which may develop at any time in a wood framed house.

These are advantages to home owners also, but there are others which have more direct appeal:

The fire hazard is reduced; danger from lightning is completely eliminated; termites and vermin are foiled; permanency is assured.

### Cost Not Excessive

Owners also appreciate the fact that these advantages are available at little additional cost. A steel framed house costs only 1 to 2 per cent more than one with a wood frame, and the maintenance expense is so much lower that this differential can sometimes be absorbed in a single year.

A steel framed house requires about 1¼ tons of steel per room. (A room 15 by 20 feet is considered average.) A 5-room house, which is the size of 50 per cent of the houses built in this country today, thus calls for a little more than six tons of steel.

In normal times, about 300,000 houses are built every year; at present, less than one per cent of them have all-steel frames. Ten per cent more use up to two tons of structural shapes for floor beams, door and window lintels.

The problem of converting to steel a majority of the houses that will be built in the future calls for sound engineering, selling and distribution. A happy combination of these three forces, notably through the medium of many local fabricating and sheet metal shops, has already dented the market. This dent is gradually deepening.

## Merger

WHEN it was announced Aug. 28 that Republic Steel Corp. would take over the Corrigan, McKinney Steel Co., Cleveland, and Truscon Steel Co., Youngstown, O., it was rumored that the Otis Steel Co., separated from Corrigan-McKinney only by a fence, would eventually be found in the Republic organization.

Since then, quiet negotiations have

been conducted, but nothing developed publicly until last Monday E. J. Kulas, president of Otis, issued the following statement:

There has been a good deal of newspaper comment on the possibilities of the Otis Steel Co. entering the Republic-Corrigan, McKinney merger. Because of these comments I feel our shareholders and our customers are entitled to a statement from me of our company's position in the matter.

On behalf of the Republic Steel Corp., two tentative proposals have been made for the acquiring by Republic of the property of the Otis Steel Co. These proposals have been carefully analyzed by our board of directors which today decided that the proposed terms of acquisition were such that they could not recommend them to the shareholders of the Otis Steel Co.

Formed in 1873, Otis was one of the first producers of steel ingots by the basic open-hearth method. In 1931 it completed a 4-high continuous hot strip mill, of the type Republic has intimated it might erect in its new Corrigan division. Otis operates two blast furnace stacks, eight open-hearth furnaces and is rated at an annual capacity of 400,000 tons of pig iron, 1,000,000 tons of ingots, and 560,000 tons of finished hot rolled products, chiefly plates, sheet and strips.

## Washington

JULEAN ARNOLD, commercial attache in China, now in Washington, has been conferring with the machinery and agricultural implements division of the bureau of foreign and domestic commerce concerning opportunities in China for the sale of American machine tools.

According to Mr. Arnold, China is now emerging from domestic handicraft into mechanized industry. Its huge industrial population is attaining higher standards of living, and tremendous markets for equipment are opening up, but need to be developed by properly qualified businessmen with essential technical training.

Mr. Arnold also believes China offers a wide market for the sale of used rails, locomotives, cars and other railroad equipment. A new Chinese finance corporation has been organized which will co-operate with the new American export-import bank. China now has 12,000 miles of railroads, needs 100,000 miles, is now using standard gage equipment and at the outset wants to buy light equipment.

¶American Saw & Mfg. Co., Springfield, Mass., operating under a treasury decision in 1931 providing a drawback on hack saw blades, has been granted a similar drawback on sheet steel.

## Institute

ONE new resolution, an amendment to another and amendments to regulations No. 2 and No. 4 have been adopted by the American Iron and Steel institute, all effective Oct. 18.

The new resolution, No. A32, deals with reductions in the delivered prices for drawn wire of basic or bessemer low-carbon steel, of either bright, annealed or galvanized finish, for shipment in carlot quantities or larger, to manufacturers in and around Anderson, Ind.

The amendment to the resolution, No. A7, permits a code member, selling a product in intrastate commerce within the states of California, North Carolina, Kentucky, Iowa, New Mexico or West Virginia, a deduction from the base price in an amount which shall not exceed the sales tax payable under the laws of such states, respectively. Under the original resolution, the ruling applied only to sales in intrastate commerce within the state of California, North Carolina or Oregon.

Amendments to regulations No. 2, in three instances, were drawn up principally to include manufacturers of cement-lined pipe among consumers to which producers of tubular goods could allow deductions, within the limits prescribed by the regulations. Also the definition of a jobber as referred to in these regulations will be based on regulations No. 7, instead of regulations No. 1 as heretofore.

One, the fourth and last amendment to regulations No. 2, permits reductions in the delivered price on tool steel in quantities not exceeding 30 pounds. For delivery at any point in the United States on or east of the Mississippi river, and in or north of the states of Kentucky, West Virginia and Virginia, a reduction of not more than 7 cents per pound less than the all-rail freight otherwise chargeable from the basing point is now permitted; for delivery at any point on or east of the Mississippi and in or south of Tennessee and North Carolina, a reduction of not more than 9 cents is allowed. These are in addition to regulations which govern, similarly, reductions in two other sections of the United States.

Amendment to resolutions No. 4 adds South Haven to Michigan pig iron consuming points to which producers may allow certain concessions on water or rail-and-water shipments of 1500 gross tons or over.

## Financial

GENERAL ELECTRIC CO., Schenectady, N. Y., reports sales billed in the first nine months of 1934 totaled $121,735,122, or 25 per cent over the comparable period of last year. Profit available for common stock in that period was $11,714,247, equal to 41 cents a share, compared with $6,886,600, or 74 cents a share in the opening three quarters of 1933.

¶Stockholders of the Mesta Machine Co., Pittsburgh, Friday approved the plan for increasing the amount of common stock from 1,000,000 shares to 1,400,000 shares of $5 par. This is in connection with a stock dividend

*STEEL BINDS NEW YORK BOROUGHS CLOSER: Worm's eye view of one massive steel tower of the new Tri-Borough bridge that will link Manhattan, Bronx and Queens across East river. This is part of span from Astoria to Ward's island. Photo is by Wide World*

and recall of all the preferred stock. See STEEL for Oct. 15, p. 17.

¶Metal Package Corp., New York, a Delaware corporation and a subsidiary of McKeesport Tin Plate Co., McKeesport, Pa., is proposing a $900,000 issue of common stock in 15,000 no par shares to be offered at not less than $60 a share. Each share is to have a stated value of $30.

# Meetings

FABRICATED Metal Products Federation will hold its first annual meeting in the Higbee auditorium, Cleveland, at 10:00 a.m., Oct. 31. This federation was organized Oct. 10, 1933, at a meeting held in Washington by a number of manufacturers. It was recognized by NRA as a representative body of the fabricated metal industry for the purpose of submitting a basic code covering that industry.

At this Oct. 31 meeting in Cleveland reports will be submitted by officials of the federation on what has been accomplished. On this occasion Col. Geo. S. Brady, assistant administrative officer of NRA, will be a principal speaker. Suggested changes in the by-laws of the federation will come up for attention by the board directors. A new board of 24 directors will be elected to serve for the ensuing year.

H. S. Kimball is secretary-treasurer, with headquarters at 729 Fifteenth street, N. W., Washington.

### LUBRICATING GREASE MAKERS HEAR PAPERS, NAME OFFICERS

Presentation of two papers and consideration of code matters and other problems of the industry occupied about 55 members of the National Association of Lubricating Grease Manufacturers at their second annual convention, held at the Hotel Stevens, Chicago, Oct. 16-17.

O. L. Maag, lubricating engineer, Timken Roller Bearing Co., Canton, O., discussed "Industrial Lubrication and Lubricants." This paper covered recommended lubricants for use in various types of industrial machinery, including rolling mills. A considerable portion of the convention was devoted to a discussion of code subjects.

New officers elected by the association for the coming year are: President, M. B. Chittick, Pure Oil Co., Chicago; vice president, W. H. Saunders, International Lubricant Corp.; secretary, Guy Peters, Oil-Kraft Corp., Cincinnati; treasurer, E. V. Moncrieff, Swan & Finch Oil Corp., New York.

¶Dr. V. N. Krivobok, professor of metallurgy, Carnegie Institute of Technology, Pittsburgh, will deliver before the Chicago chapter of the American Society for Metals Nov. 8 at the Medinah club, Chicago, the Campbell memorial lecture which he gave two weeks ago before the national convention of the society in New York.

# Transportation

STRUCTURAL steel fabricators will meet in Chicago, Oct. 24, the day before the opening of the convention of the American Institute of Steel Construction Inc., to discuss a plan to oppose the general freight rate advance proposed by the railroads, and to consider the new steel code regulation No. 9 radically revising the fabrication-in-transit charge in official classification territory.

# Labor

A SECOND postponement has further delayed hearing before the national steel labor relations board of charges against the Jones & Laughlin Steel Corp., directed at alleged coercion at Aliquippa, Pa. The hearing originally set for Oct. 5 was first postponed to Oct. 19, and last week was moved ahead to Oct. 26 at Pittsburgh.

The Amalgamated Association of Iron, Steel and Tin Workers has alleged that so strong were coercive moves made by Aliquippa town officials that they were forced to journey across the Ohio river to Ambridge, Pa., whenever their small band desired to hold a meeting.

### COUNT AMALGAMATED VOTES

Oct. 20 was the official "counting day" for the Amalgamated association. On this date the election board met at Pittsburgh, and formally opened ballots cast Sept. 15 for union officers. There were only about 5500 votes, or an increase of but 1000 during the past year, which admittedly is a poor showing.

While results are now in the midst of being tabulated, rumors in Pittsburgh declare the race probably as "very close" between incumbent Michael F. Tighe and rank-and-filer George J. Williams, for the office of president.

### GMC DEFINES BARGAINING

General Motors Corp. last week over the signature of Alfred P. Sloan Jr., president, mailed to its 130,000 employes a detailed statement of the philosophy and principles governing its relations with employes.

General Motors takes the position that the phrase "collective bargaining" is not merely a question of union recognition. Bargaining is recognized as a constructive step forward for both employe and management when there is no restraint or coercion upon employes in choosing their representatives.

Pledging itself to permitting employes free rein in selecting their representatives, General Motors lays down definite procedure whereby appeals can be had.

### OPPOSES 30-HOUR WEEK

Gen. Hugh S. Johnson, formerly NRA administrator, declared last week that an attempt to increase employment by a statutory 30-hour week probably would wreck the entire recovery program. A 30-hour week was advocated by the American Federation of Labor at its recent convention in San Francisco, and chances are bright that a 30-hour bill will pass the next sessions of congress.

A campaign by organized labor for a 30-hour week will be met with revolt from the farmers and the white collar classes when they become aware such a move would increase prices 33 1/3 per cent, he forecast.

# NRA

DONALD R. RICHBERG, chairman of the President's new policy making committee and thus indirectly next to the President in authority over NRA, predicted a middle of the road course for NRA in address in Indianapolis last Monday.

He forecast that the new national industrial recovery board would review, industry by industry, "the effects of existing codes in order to promote the co-operation of those interested in each industry in the maintenance of a code best suited to its health." And then with a much

(*Please turn to Page* 75)

# Production

STEELMAKING production came through last week with a gain of 1½ points to 26½ per cent, due in large measure to heavy production of semifinished steel in anticipation of demand for automotive material.

Advances ranging from ½ to 2 points were noted at Chicago, Pittsburgh, eastern Pennsylvania, Youngstown and Cleveland. In the New England, Buffalo, Birmingham and Detroit districts there were no changes, while Wheeling was the only one to register a loss. The outlook for this week is for little change. Details for various districts follow:

**Cleveland-Lorain** — Increased 3 points last week to 31 per cent, and this week the rate is expected to advance to 36 per cent. The rise is due entirely to improvement at Lorain. National Tube Co. last week lighting its sixth open hearths and scheduling all eight of its units this week. Corrigan, McKinney Steel Co. continues with four, and Otis Steel Co. with two.

**Youngstown**—Rose fractionally to 30 per cent last week, but the rate is expected to decline 2 points to 28 per cent at this week's start.

**Detroit**—Unchanged at 59 per

cent last week, with 1 out of 17 open hearths on.

**Pittsburgh** — Advanced 2 points last week to 20 per cent, with increases being shown mainly by district independents. Though a leading interest continues to show operating schedules barely supporting an 18 per cent ingot rate, the independents in the district have all advanced melting rates within the last week.

When Pittsburgh Steel Co. resumed blast in one of its Monessen, Pa., stacks last week, the number of active blast furnaces in the district was increased to 14 out of 60. Of the active 14, seven are Carnegie Steel Co. stacks; three are for Jones & Laughlin Steel Corp., two for Bethlehem Steel Co. at Johnstown, Pa., and one each for Pittsburgh Crucible Steel Co. and Pittsburgh Steel Co.

The operating outlook for this week credits a further expansion to ingot-making schedules. Although the gain will be small, steelmaking may move up to 21 or 22 per cent.

**New England**—Unchanged at 40 per cent last week. Operating schedules starting this week indicate little change.

**Buffalo**—Held at 24 per cent last week, for the fourth consecutive week. This rate has been sustained for a longer period than any which has been similarly established here in many years. While a slight pickup in business was noted during the past week, it was not sufficient to warrant immediate increase in operations. Nine of 38 open hearths are producing.

**Birmingham**—Holding at 25 per cent last week, steelmaking production in this territory shows little, if any, improvement. No early change is indicated.

**Central eastern seaboard**—Up approximately 2 points last week to 19 to 20 per cent, the resumption of four open hearths at one eastern mill being the major contributing factor. In the preceding week, steelmaking at this plant was suspended entirely.

**Wheeling**—Averaged 23 per cent last week, down 10 points from the week before. This week steelmaking schedules will advance 6 points to 29 per cent, when there will be 11 out of 39 open-hearth furnaces on.

### SHEET SALES INCREASE

Daily average sheet steel sales of independent makers for September increased to 2569 net tons from 2131 tons in August. Production averaged 2535 tons, compared with 2490 tons in August, while shipments declined from 2506 tons in August to 2442 tons in September. Totals for September, according to the National Association of Flat Rolled Steel Manufacturers, Pittsburgh: Sales 77,063 tons; production 76,051 tons; shipments 73,260 tons. Total sheet capacity in the country for September was approximately 550,000 tons, and the capacity on which the association's figures are based was 325,000 tons.

# Foundry Visitors On Inspection Trip

FOREIGN delegates to the fifth international foundry congress and the American Foundrymen's association convention and exposition which are to be held in Philadelphia, Oct. 22-26, have been inspecting the more important foundry centers.

Arriving in New York Oct. 10 and 11, these delegations visited Buffalo, Chicago, Milwaukee, Detroit, Saginaw and Flint, Mich., Cleveland, Pittsburgh and Washington. The tour was under the direction of the A.F.A., and local committees of foundrymen entertained the group at various points.

The list of foreign delegates, some accompanied by their wives, follows:

**From Belgium**

J. Leonard, Association Technique de Fonderie de Belgique, 45 Rue du Fourneau, Grivegnee.

**From England**

F. H. Hurren, Coventry Malleable & Aluminium Co. Ltd., Lincoln street, Coventry.

J. B. Allan, Staveley Coal & Iron Co. Ltd., Nr. Chesterfield.

James Smith, National Ironfounding Employers' federation, Smith & Co. (South Shields) Ltd., Nile street, South Shields, Durham.

Harold Jeans, Industrial Newspapers Ltd., Wellington street, Strand, W. C. 2, London.

Mrs. Harold Jeans.

H. Spence Thomas, Vice President, British Iron and Steel institute, "Nile" Cubitts Dock, Hartington road, Chiswick, London, W. 4.

Tom Makemson, Secretary, Institute of British Foundrymen International committee, St. John street, Chambers, Manchester.

Vincent Delport, Penton Publishing Co. Ltd., London, European member A. F. A. Committee on International Relations.

**From France**

Raymond Benoist, Acieries Electriques d'Ugine, 20 Avenue Pierre Blanc, Albertville (Savoie).

R. Bachon, S. A. des Usines de Rosieres, Bourges, Cher.

Etienne Magdalenat, S. A. Usines de Rosieres, Bourges, Cher.

A. Brizon, Fonderie A. Brizon, 57 Rue Emile Deschanel, Courbevoie (Seine).

Madame A. Brizon.

P. Daugenet, Fonderie des Ardennes, Rue du Bois d'Amour, Mezieres (Ardennes).

G. Daugenet, Fonderie des Ardennes, Rue du Bois d'Amour, Mezieres (Ardennes).

Robert Coqueugnot, Jr., c/o H. Coqueugnot, U. C. P. M. I., 31 avenue Montaigne, Paris.

Henri Vicaire, Directeur de la Division de Villerupt, de la S. A. Metallurgique d'Abrasives et Villerupt, Villerupt (M. et M.)

**From Germany**

Prof. Eugen Piwowarsky, Intzestrasse 1, Aachen.

Obering Schleimer, Bergishe Stahlindustrie, Reimsheid.

**From Italy**

Ing. Cesare Covini, Societe Anonyme ILVA, Via Corsica, 4, Genoa.

Ing. Fausto Bondolfi, Societe Anonyme ILVA, Via Corsica, 4, Genoa.

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Dr. Ing. Luigi Norsa, Soc. Ernesto Breda, Via Bordoni, Milano.

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Cav. G. B. Martinelli, Ditta G. B. Martinelli, Morbegno (Sondrio).

Comm. Avv. Mauro Baggini, Soc. Finanziaria Industriale, Via Carissimi, 33, Rome.

Cav. Uff. Secondo Mona, Officine Meccaniche Secondo Mona, Somma Lombardo.

Tommaso Bombaglio, Officine Meccaniche F. li Bombaglio, Varese.

Bruno Beltrame, Acciaieria e Ferriere Vicentine, Plazza Giuseppe Giusti, Vicenze.

Mademoiselle Cesira Beltrame, Vicenza.

**From Spain**

Don Jose Navarro Alcacer (Prof.), Spanish Committee on Testing Materials.

Don Jose Iturrioz, Ajuria S. A. Vitoria, Olaguibel 24, Vitoria.

# Want Record Painting Job?

*BIDS close Nov. 7 on what is believed to be the largest structural steel painting contract ever placed—the final field painting of the San Francisco-Oakland Bay, Calif., bridge, including the West and East bay spans. Exclusive of* 226,000 *linear feet of* 2¼*-inch suspender ropes and* 38,000 *feet of* 1*-inch hand ropes,* 123,750 *tons of structural steel and cables will be painted, including* 24,000 *tons in the towers,* 39,000 *tons, west spans, and* 58,000 *tons, east spans; also* 19,000 *tons of cable and* 850 *tons of cable castings.*

# Continuous Mills Voracious In Cost, but How They Produce!

By JOHN D. KNOX

*WITH SHEET & Tube and Ford actually installing new continuous wide strip-sheet mills and Carnegie, Republic, National and one other large producer considering them, these mills are the livest issue of the steel industry today. What tonnage will they produce, what markets will have to be developed to support them, how much labor will they displace technologically? John D. Knox, an associate editor of* STEEL *and a practical mill man, discusses these aspects authoritatively in the accompanying article, which is breezy and easy to read but packed with facts.*

John D. Knox

WHILE walking across the yard of a steel plant with a mill executive the other day, my attention was directed to a building housing a modern sheet mill. My friend asked me if I'd like to have a look at the equipment on the inside.

How would you have replied had the question been put to you? Well sir, with the itch of the steel business under your skin, you would have answered in the affirmative, the same as I did.

For the steel business is a great deal like railroading—once you get a sniff of it, particularly the operating end, you become a life member. It's in your blood never to depart.

There is a fascination waching the charging machine crunch its way along the rails on the open-hearth floor and the craneman at the rear of the furnace swing a cauldron of sparking metal from the standards beneath the furnace runner to the pouring station and, with skill, spot the nozzle over the first mold in the train.

### Interest Never Lags

Let the call of steelmaking beckon you and you'll never tire of listening to the dull thud of the red hot ingot hitting the blooming mill rolls, followed sometimes by explosions and the spitting forth of steel slugs like miniature shrapnel; nor of hearing the hum of mill motors and the rumbling of gear trains as they impart action to the mill rolls.

And when I told my friend I surely would be glad to take advantage of his kind invitation you should have beheld the twinkle in his eyes. He was just like a kid bubbling over with joy. I had struck his heart chord, for he was intensely interested in this mill.

Try as he would, he just couldn't conceal his feelings. This mill was his "baby." He had lived with it day and night from the time foundation pits were sunk until the rolls were turned over for the first time.

We headed toward the front end of the building, and as my eyes scanned the roof line of the structure I didn't gain the impression that a mill for rolling sheets was installed inside.

There were a couple of stacks which pierced the roof at one end of the building, but the stacks with dampers and lazy columns of black smoke belching from pair furnace combustion chambers such as you are accustomed to see on the exterior of conventional type sheet mills—where were they? Not one was to be seen.

Just about this time we entered the building and little wonder stacks and dampers were missing. I didn't see any sweaty heaters dragging red hot sheet bars over the floor from pair furnaces to the roughing mills. I didn't hear the familiar metallic ring of jump rolls reverberate through the mill building that I had expected to hear when heated sheet bars are fed into the gap of the rolls.

Nor did I see any catchers on the back side of the mill catching roughed-down sheets with tongs and passing them with precision back over the top of the mill to the roller.

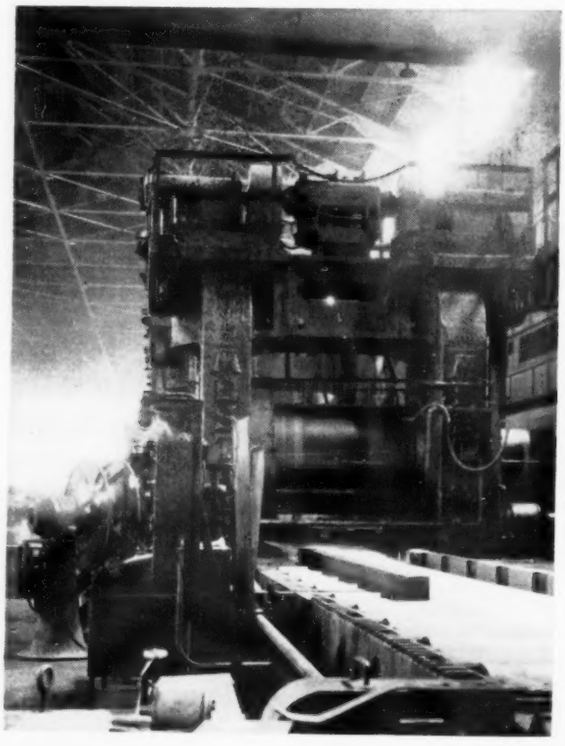
Nothing like this, for I was looking at an entirely different layout. It was a sheet mill alright, but not one of the conventional type with the 2-high mills coupled in train.

There, stretching down the main bay of the building for about 500 feet was stand after stand of 4-high rolls—roughing stands in one group and finishing stands huddled together in another group. They stood like sentinels. And beyond lay the hot bed with its familiar runout tables and gratings which seemed endless.

Along the cooling bed at predetermined distances were coilers, levelers and side and end trimming shears, and way in the distance, at least 1000 feet from the last finishing stand, I could discern pieces of machinery which I was told included rotary shears and levelers, slitters and squaring shears.

I was looking at a continuous sheet mill. My friend at my side was stressing the many details of its operation and in his enthusiasm used his right hand in directing my attention first in this direction and then in that direction.

A shriek of a whistle warned us to get out of danger, for in our mutual



*HERE IT COMES at the rate of 96 tons per hour from the finishing stand of a modern 4-high sheet mill. Mills like this, either actually in operation or proposed, have a potential annual capacity of 6,336,000 tons, creating new problems of market and technological employment. Photo courtesy of Inland Steel Co., Chicago*

interest in the mill layout we had neglected to notice that we were standing each with one foot on the track leading to the slab yard. And as we stepped aside we watched a little dinkey locomotive emitting sizzling steam from its stubby smoke stack as it pushed a carload of fresh slabs along the incoming tracks at a lively gait.

Shortly the puffing ceased, and as though from sheer exhaustion the little dinkey came to a gradual stop not far from the charging end of a heating furnace.

"What's a mill like this cost?" I ventured to inquire.

Noticing that I continued to manifest interest in his "pet," my friend started toward a wooden bench located along the sidewall of the mill building, beckoning me to follow. When we were seated, he leaned back on the bench, anchored his thumbs in the arm openings of his vest and here is what he told me:

"One like this in front of us would stand about $6,000,000 to $8,000,000, but I'll tell you," said he, "from what I've seen of this business, the newcomer in the field who spends over $3,500,000 to $4,000,000 for a mill to roll broad strip will never be able to pay the capital charge. He'll show a profit per ton of finished product all right but this is a whole lot different than the capital charge."

"Even so," said I, "That's a lot of money."

### Fixed Charge a Factor

"Sure, it's a lot of money, particularly when you consider the fixed charge per ton of output in times of depressed market conditions. But take a hand mill for instance—an 8-mill plant for turning out high-grade tonnage. A mill of this order would cost at least $1,950,000.

"Look at the crew you'd have on each roughing and finishing mill. Fourteen at least—a roller and his helper, a pair heater, a sheet heater and his helper, a rougher, a second rougher, a doubler, a matcher, catcher, a shear tender and his helper and a couple of openers. On eight mills, 112 men per shift—336 men per day. That's a lot of men."

"About 60,000 tons a year would approximate the annual tonnage of a conventional mill, wouldn't it?" I asked.

"They couldn't knock out any more than 60,000," he replied. And raising his voice, he said, "Watch that slab going through the mill," pointing to a heated rectangular piece of steel which had just been ejected from the heating furnace down over skids on a series of rollers which moved it forward through a scale breaker into the first stand of roughing mill rolls.

And I did. It ran the gamut of 4-high rolls with clock-like precision, gaining speed and length as it progressed from one roll stand to another. Once free of the last stand of finishing rolls the strip, now having the appearance of a golden ribbon, seemed to float along the side of the hot bed as it was whisked away to the shears, finally disappearing at the far end.

*BETHLEHEM'S PRESIDENT AFTER A SEA TRIP: Eugene G. Grace on his return to New York, Sept. 27, following a brief European vacation. Acme photo*

And as I watched the piece of strip disappear in the distance and another wend its way through the rolls, I turned to my friend and asked him what a mill like this one would knock out in the way of tonnage. I mentioned that I had heard of another continuous sheet mill having sent 1800 tons over the hot bed in a day.

"What do you mean, by 1800 tons? Do you mean gross or net?"

"I'm unable to answer your question," I replied, "for the figure I heard merely was 1800 tons."

"The reason I asked is that some companies in speaking of record runs usually refer to slabs charged in net tons instead of gross.

"You ask what a mill like this one will do in the way of tonnage," he said then his hand found its way to his hip pocket and out came a notebook. A flip of the cover and he turned to a certain page where figures were arranged in an orderly manner. His index finger moved slowly down the first column and stopped at a line midway on the page.

"How is this for a day's run?" he said with a chuckle, pointing to four figures.

The 1800 tons I had cited as having been produced by another company looked sick compared to the figures on which my eyes rested, for his finger pointed to 2316 gross tons.

"Not bad, eh? Listen to this," he continued. "The first turn sent 601 tons over the hot bed and in this batch there were 20 different specifications. The second rolled 989 tons in five specifications and on the last turn the boys called it a day by knocking out 790 tons in 24 specifications. That's an average of 96 tons an hour and, you see, the rolls didn't get much of a chance to get cold. This baby speaks pretty loud when you talk about tonnage in the rolls.

"And what's more," he continued, "she'll make 2500 or 2600 tons a day any time the boys up in the sales department want to send us the business. I'm not braggin', I'm just telling you what she'll do."

### Responds With Hearty Laugh

And then he laughed. You should have heard him. It would have done your heart good in these days of perplexity.

"At the rate of 2500 tons a day and working 24 days a month," I said, "you'd deliver to the shipping end of your mill 60,000 tons monthly or exactly what a plant with eight conventional sheet mills would produce a year. In other words, on the basis of gage for gage your mill will produce 12 times the output of a conventional eight-mill sheet plant."

"Sure thing and with a lot less men. Take your eight hand mills," he continued, turning the leaves of his notebook until he came to a blank page.

"You have a crew of 112 men per turn," he said writing these figures at the top of the page. "Now add a craneman, a sheet bar stocker and a couple of helpers, a yard clerk, and four shearmen and their helpers and you have a total of 125 men or 375 required to man the mills per 24-hour day.

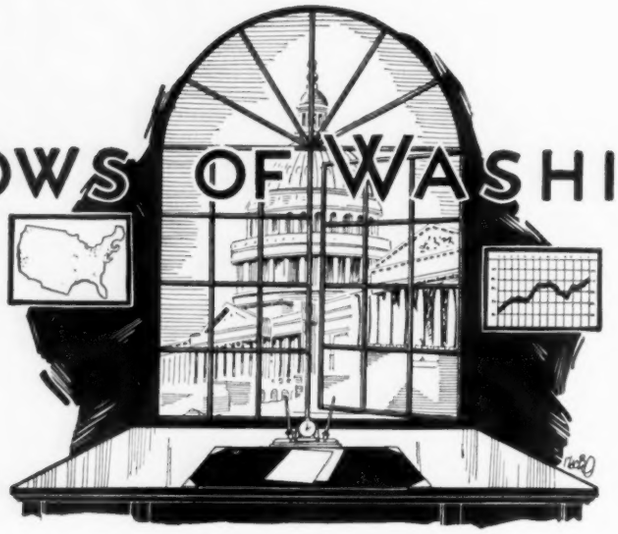
"Now let's see. On the back of the heating furnaces of this continuous mill we have a heater and a couple of helpers, a furnace charger, a furnace stocker and a couple of helpers, a clerk in the slab yard and a couple of cranemen. That's a total of 10 men," he said adding up the figures he had set down after each of the occupations.

### How About the Other Men?

"On the mill proper we have a head roller and one assistant, a gager, a rougher and his operator and helper, a couple of rolls hands, a speed regulator and his helper, a finisher and his assistant, a looper operator, an operator for the runout table and his helper, an inspector, a recorder, a roller leveler operator, a hot bed recorder, a shear foreman and his crew of eight men, one torchman for

(*Please turn to Page* 23)

# WINDOWS OF WASHINGTON



*WASHINGTON*

ONE by one leaders of industry are being ushered into the blue room of the White House, which the President is occupying during the reconstruction of the office wing, for conferences which are unreported but presumably are designed to narrow the gap between industry and the new deal. Last Monday Myron C. Taylor, chairman of the United States Steel Corp., crossed the threshold for steel.

Down at NRA headquarters in the department of commerce building General Johnson has evacuated, wicker blue eagle and all, and at his desk now sits S. Clay Williams, chairman of the new industrial advisory board, who made his millions in Reynolds Tobacco (Camels and Prince Albert) and has the industry point of view. All through NRA a new helpful spirit prevails.

### AID LABOR FOR $40 A DAY

Up at the department of justice, Attorney General Cummings has confounded the various labor relations boards, whose members draw $40 a day and expenses, by refusing to prosecute the Houde case. Thereby Mr. Cummings has seriously undermined the principle of majority representation of labor for collective bargaining, which these boards have been attempting to foist on industry. Secretary of the Treasury Morgenthau pleased anti-inflationists last week by announcing that the profits from nationalizing silver will not be used as the basis for more paper money.

Donald Richberg has made his peace with the steel code authority. Secretary of Commerce Roper is issuing copious publicity on attractive foreign markets for American products. The cat has the federal trade commission's tongue, and it is not saying a word even on steel basing points. The securities exchange control commission is so mild it is disappointing its radical proponents. In fact, all government agencies are refraining from pinpricking business.

Such things do not just happen. Those in Washington who have been engaging in wishful thinking and are skeptical of any apparent trend to the right because they have been disillusioned so many times recently are searching for a reason.

Certainly, they argue, any upturn in business in the fall normally develops before this time, and the prospects of creating one during the remainder of the year face the handicap of adverse seasonal influences. Anyway, such an upturn is not necessary to bolster the political situation, because the November election apparently already is "in the bag."

### AWAIT WILD-EYED CONGRESS

This, in fact, may explain the present situation. A congress even more top-heavy with Democrats seems certain to be seated in January, and if anything there will be too many Democrats in it to insure orderly control. There are plenty of indications that it will be dangerously radical.

It is not difficult to visualize a congress running amuck and proceeding on the theory that it has a mandate to vote mandatory currency inflation, appropriate more billions for relief, pass 30-hour week, unemployment insurance, old-age pension and other social-reform bills.

Such a situation puts a powerful weapon in the hands of the President. Embarrassing as such radicalism would be to him, it would be much more disastrous to industry. It puts the President in position to point out to industry that it would be better off by getting behind an administration social-reform program than by running the risk of arousing congress to passing an intemperate one.

To narrow the situation to a specific issue, costly as a 36-hour work week might be, by going on this basis industry might avert a compulsory 30-hour week.

Industry can count on it that its present wooing by the administration is for some deep-seated reason. It would be incongruous were industry to join forces with the President and accept a measure of the new deal in preference to something worse.

At the end of the Johnson regime in NRA it was industry and the general against labor. It might possibly be industry and the President against a radical congress.

NRA is not the listless, discouraged, dispirited place it was a month ago. Its morale has been lifted. The feeling that it has become stymied has entirely disappeared. Among the presonnel there is a confidence that it may yet be saved.

Gathering up and putting together the pieces left when General Johnson retired, which occurred officially last Monday, is going to be no small task. In ten weeks congress will have reconvened, and there will be almost as many plans for NRA as there are members of congress.

### NEW BOARD IS POPULAR

The new advisory board, on which in addition to Chairman Williams are Arthur D. Whiteside, head of Dun & Bradstreet's, Walton Hamilton, Leon C. Marshall, Leon Henderson, Blackwell Smith and Sidney Hillman—the latter a conservative representative of labor—has the confidence of the entire organization.

Showing that it is reasonable, one of the new board's first acts was to grant a retroactive stay on the structural fabricators' code, thereby terminating official embarrassment.

When NRA was organized a year ago June it attracted the services of outstanding men. But one by one they fell away, among the reasons being their inability to make or obtain decisions, the crackdown tactics of General Johnson, and the influx

of Farleyites to whom a little authority went a long way.

Now, W. L. Allen, formerly with the Carnegie and Sheffield Steel companies, has returned. So has W. Averill Harriman, chairman of the Union Pacific railroad.

Edward R. Stettinius Jr., a vice president of the United States Steel Corp., who formerly was a liaison officer of NRA when he was with General Motors, is returning for a short time to assist in personnel matters.

Evidencing this new spirit of helpfulness to industry, hearings are being scheduled by NRA for outside points, compared with a former policy of holding all in Washington. The calendar of hearings for the period Oct. 18-29 shows 14 hearings to be scheduled in Washington, compared with 19 at Cleveland, Buffalo, St. Louis, Kansas City, Mo., Cincinnati, Wheeling, W. Va., Vincennes, Ind., Concord, N. H., and other cities.

While Mr. Richberg has explained away his Baltimore attack on the steel code, and disposed of rumors that price and production controls would be jettisoned, there is a phrase of the steel code that still rankles. It is said a steel attorney drafted it, cloaked it in complicated verbiage, and NRA has been called upon to defend its complexity.

ENTHUSIASM for low-cost housing as the new industry to lead the country out of depression, much as the automobile industry did in 1921, received a filip last week when the President let it be known that he expects to include a generous proportion of housing, slum clearance and rehabilitation in the relief program to go to congress in January.

At the same time, officials of the federal housing administration (FHA) were putting final touches on rules and regulations to give effect to title II of the housing act, under which $2,000,000,000 will become available. This, rather than modernization, will be the major objective of FHA.

### A REAL OPPORTUNITY!

There is a good deal of sentiment in Washington, among the government, that this may be the steel industry's great opportunity. Since the lighter forms of steel rather than the heavier ones would fit into the housing program, the prospects for absorbing some of the output of the new continuous strip-sheet mills may be opening up.

FHA will advance along two fronts. One will be the construction of low-cost houses, the other, apartment housing to replace slums. In both, FHA wants steel in the picture; in fact, it is almost daily consulting with representatives in Washington of those steel producers who have sensed the vast market just ahead.

As to individual houses, the need appears to be for 4 or 5 room dwellings, 2 stories, costing $2000 to $3000. It is estimated that there are 40,000,000 persons who have never owned a house or dreamed they could build one; this is persons, of course, and not families.

In the Mississippi valley, for example, there are 43,000,000 persons, only 10 per cent of whom enjoy the comfort of electricity or running water. The conclusion is that 90 per cent of them reside in substandard houses. Showing what can be done by sales campaigns and credit, 60 per cent of the families in this area have automobiles, and 40 per cent radios.

For the present, interest centers on steel framing rather than the all-steel house, including the exterior. Including piping and accessories, it is believed that the small houses contemplated will take about 2 tons of steel, and for larger ones the estimate runs as high as 6 tons.

### FHA WILL SELL IDEA

To translate this potential market into present-day terms, the construction of 1,250,000 of such small houses would develop an outlet for steel equal to the automobile industry's consumption this year.

What FHA is going to do is to stimulate the desire for such houses. The opportunity for steel is to be ready with plans and definitely-designed materials to meet the need. The appeal of a steel frame house over wood should be apparent, to say nothing of its being better collateral because amortization of a loan could be spread over a longer period.

As Washington sees it, standard structural shapes will not do, not even the lighter sections. Pressed strip steel sections, welded, appear preferable both on account of weight and cost. In the government's first big housing project in Philadelphia for textile workers, reinforced concrete beat out structural steel handily. More projects are going ahead, FERA Administrator Hopkins having plans for 12 towns of small houses.

Pre-fabricated sections also are required, to expedite erection and reduce labor costs. The effort is to split labor costs about evenly between shop construction and erection on the site. Organized labor's objections to a more restricted market for building trades labor are expected to be appeased by the use of skilled labor, like plumbers, to install plumbing fixtures in pre-fabricated sections.

The FHA plan is this: Through mortgage loan associations, loans up to 80 per cent of the cost of a project will be made. That is, a man having a $1000 lot paid for can borrow $4000 for the erection of a house. He would be charged $27.50 a month for 20 years, which would amortize the loan, pay the interest and meet average taxes. There will be a limit of $16,000 for any one house.

### REBUILD "COMPANY TOWNS"

A man in Washington who has been as close as anyone to the housing situation visualizes this opportunity for steel producers: To get together, say they can build a total of 50,000 houses at their coal and ore mines and in their mill towns, borrow 80 per cent of the cost from the government, have their experimental work virtually paid for by the government, emerge from the program with practical experience, and get credit from labor for having done a job for it. This man believes a research fund of $250,000 would set up this new industry for steel.

Several experimental steel frame houses are now being erected in Washington suburbs. Some pre-cast concrete ones also are going up, and one copper and brass company is putting up a $5500 house with copper exterior. Lumber interests already have $1 a year men working right with FHA in furthering the housing program.

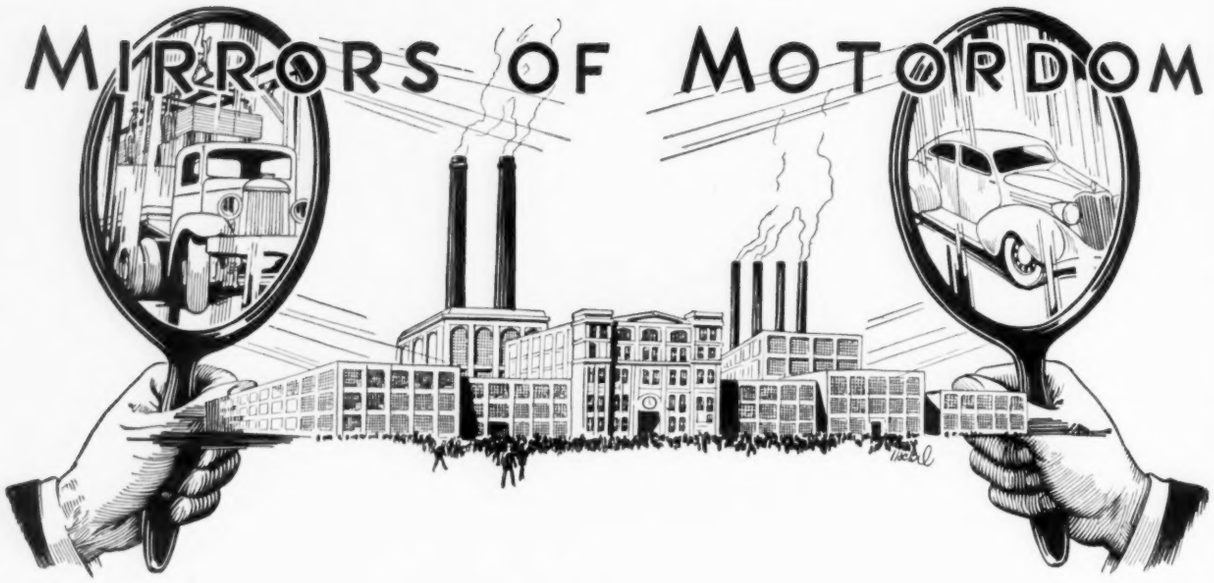
The situation sums up to this: The government is itching to get money out; low-cost housing looms up as the depression-routing industry; over the next six months this industry must be started, if at all; steel producers will have to be ready with plans and prefabricated sections by spring, when it is believed demands for loans will pour in.

## Verity Sees Washington Attitude More Helpful

*GEORGE M. VERITY, chairman, American Rolling Mill Co., Middletown, O., last week reviewed six recent developments which he interprets as a hopeful sign of a new trend in the administration's recovery program. These are:*

(1) *The President's radio address Sept. 30 referring to individual initiative and the incentive of fair profit;* (2) *Donald R. Richberg's statement that no sweeping shifts will be made in NRA policies;* (3) *assurance that any new NRA legislation will be worked out in the light of past and future experience;* (4) *Mr. Richberg's interpretation of the labor board's ruling in the Houde case that "an individual has the right to represent himself or to have a committee represent him in any grievance";* (5) *the modified and conciliatory statements by Secretary of Labor Perkins before the American Federation of Labor convention in San Francisco, Oct. 5; and* (6) *the statement of the national labor relations board Oct. 8 that the merit clause in some codes, notably the automobile code, did not conflict with the letter or spirit of the recovery act, did not interfere with collective bargaining, and did not discriminate against union men.*

# MIRRORS OF MOTORDOM



*DETROIT*

ALTHOUGH not reflected in assembly figures, signs of quickening activity became more numerous last week in the automotive industry as additional companies arrived near the end of runs on 1934 models and furthered their plans for the new models that are to make their bow within the next few months.

Steel orders and releases from car builders and parts suppliers, while still rather light, showed further gains, and the industry gives evidence of entering into a period of expanding requirements that should continue through next May.

Sentiment in Detroit leans to the optimistic side. Motor companies generally have had a favorable year, particularly when compared with 1932 and 1933; retail sales have held up moderately well during the recent and current period when a decline is natural; dealers are in an excellent position as regards stocks of present models; and a large portion of the unsatisfied replacement demand for passenger cars that accumulated during depression years remains as a potential market of sizeable proportions that stands a good chance of being released in 1935, the extent being dependent, of course, on changes in general business conditions.

### STILL BAD ROADS AHEAD

This is not to imply that the industry as a whole is rolling merrily down the rose-lined highway to a nearby prosperity; the state of the nation as a whole is such as to necessitate the traversing of rough spots, if not detours, before such a situation exists, and, in the case of a few interests competition, in addition to the depression, has inflicted damage that imperils their outlook.

Aside from the hazard in estimating sales next year, because of the uncertainties in the trend in national conditions, the specter of labor trouble next spring remains as a possible disturbing factor because of the 1934 experience. General Motors' announcement last week of its policy on collective bargaining is regarded as a constructive move that will tend to forestall a repetition of the near-paralysis of the industry this year.

Encouraging collective bargaining as a forward step for both workers and management, GMC has adopted a plan for both informal and formal hearings on grievances and for impartial or judicial agencies to determine solution of cases such as discrimination and layoffs. The plan emphasizes the desirability of settling misunderstandings within the organization. American Federation of Labor officials have expressed satisfaction over the emphasis accorded the collective bargaining principle, but this gives no assurance that unionization attempts in the industry will be lessened.

While steel shipments may be expected to continue to rise during the rest of the quarter, large tonnages are seen as unlikely to develop for another three to five weeks. Sellers view recent statements of Donald R. Richberg with reference to the steel code and prices as having a beneficial effect in removing some of the uncertainty concerning the stability of current levels, but it is admitted that reduced consumption, rather than the price factor, has been the major consideration in curtailed buying previously.

### TUNE UP ASSEMBLY LINES

Most car builders are pretty well decided on plans for 1935, production of some parts has started, and November should see assemblies under way. Introduction of new models in a number of cases, however, will be few, if any, before the January shows. Assemblies of present models are nearly completed in the majority of instances, but although a gap of more than a month will exist between now and the time when new cars start off the lines, dealers are expected to be supplied with sufficient cars to accommodate sales, some through warehouse stocks in hands of manufacturers.

Chrysler Corp. units are closed on assembly, as previously reported, except for Dodge commercial cars. Ford is practically through with the current series, while Lincoln assemblies have been suspended for several weeks. Chevrolet, however, expects to continue through this month and possibly into November on its present line before completing the 1934 run, and still appears likely to trail Ford and Plymouth in starting on new models.

Ford is reported to be building 1000 motors a day for its 1935 cars

## Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

| | 1932 | 1933 | 1934 |
|---|---|---|---|
| January | 119,344 | 130,087 | 156,907 |
| February | 117,418 | 106,888 | 231,707 |
| March | 118,959 | 118,002 | 331,263 |
| April | 148,326 | 180,713 | 354,745 |
| May | 184,295 | 218,347 | 331,641 |
| June | 183,106 | 253,387 | 308,051 |
| July | 109,143 | 229,357 | 266,575 |
| August | 90,325 | 232,855 | 234,809 |
| September | 84,150 | 191,800 | 155,000* |

*Estimated.

*Estimated by Cram's Reports*

| Week Ended | |
|---|---|
| Oct. 6 | 18,998 |
| Oct. 13 | 25,491 |
| Oct. 20 | 29,069 |

and is getting under way on new bodies. While the new Ford will have the engine mounted farther forward on the chassis and will be roomier than at present, there is some question whether there will be a major change in wheelbase.

One manufacturer, reputedly Ford, is said to be considering the adoption on new models of air seats, instead of the conventional spring variety. These consist of two layers of small, air-inflated, rubber containers and, if employed, will eliminate the use of a substantial tonnage of steel spring wire.

The motoring public will have a larger variety of cars to choose from next year, this resulting from the addition of new series by several manufacturers. Pontiac will have a six in addition to its eight; Packard and Lincoln will offer lower-priced models as well as their regular lines, while Chrysler will offer conventional models under the DeSoto, as well as the Chrysler, nameplate.

Airflow types for the latter two will be continued, and the conventional Chrysler may include an eight in addition to the six. The latter was retained this year when the airflow was introduced but DeSoto dropped the conventional design. A decline of nearly 50 per cent in production by DeSoto for the first nine months, compared with a gain of almost 40 per cent for the entire Chrysler Corp. during the same period, offers one reason for the additional model.

**Change Airflow Hoods**

To overcome the objection of stubbiness to the present airflow DeSoto the curvature of the front will be more abrupt, thereby lengthening the top horizontal section of the hood. Fender designs of the DeSoto and Chrysler airflows are unchanged.

January appears the earliest date for introduction of the low-price Packard; orders for dies were ready to be placed only last week. The price at which this car will list is reported variously at $1000 to $1200.

Lincoln, however, is well along with plans for its new offering which will wear most of the streamlining ideas that this company will adopt for its 1935 products. The new line is expected to be a V-12 on a 122-inch wheelbase, selling for about $1250. Higher-price models are to continue relatively conservative in appearance, despite some streamlining.

The fact that new lines to be introduced next year fall into a price field already well blanketed by existing models points to a further heightening of competition which now is keen and which has proved unprofitable to several of the smaller companies despite gains in production during 1934.

Chrysler, Ford and General Motors accounted for 84 per cent of total production the first nine months this year, against 86 per cent in 1933, while output for the industry was rising more than 52 per cent. Several of the leading independents, however, have had substantial losses in the face of heavier sales. The small company still has an advantage in its ability to make radical design changes more easily than its large competitor when considerable retooling is involved, and the future of the former is seen as depending on its initiative in sponsoring new engineering developments and style changes that appeal to a definite class of buyer.

Hudson-Terraplane has curtailed production from 600 units weekly to 450 and will complete 1934 assemblies early in November. Sales increased recently, this being attributed to the effect of the company's "Ruggedness Runs" staged over 17 courses throughout the country. Further curtailment in stocks lately has brought the number down to only slightly more than two cars per dealer. Retail demand for the industry as a whole, while still declining, has been dropping no faster than would be expected for this period.

# Continuous Mills Cost, but Produce

(*Concluded from Page* 19)

burning cobbles and three cranemen.

"That's a total of —let's see," and adding up the column he arrived at a total of 32 men to operate his mill or 42 men per turn including the furnace attendants. "This is 126 men to handle the mill per 24 hours."

"In other words," I chimed in, "with 126 men in the slab yard, on the furnace and overseeing the mill you can turn out 2500 tons a day whereas it would take 96 sheet mills of the conventional type with a combined crew of 4512 men to produce an equivalent tonnage."

"Yes sir, that's about the setup. And I'll tell you, I don't think the building of broad sheet mills has run its course. Right now two mills are being laid down. Youngstown Sheet & Tube's mill at Campbell, O., has rolls with a 79-inch face and, I'm told, they're going to roll up to 72 inch maximum width in 12-gage sheets and heavier. Ford's new mill, I understand, will roll 48-inches wide in gages 18 and heavier."

"How much power does it require to drive one of these mills?" I inquired.

"Mills like Sheet & Tube and Ford are building," he said, "each will take about 500 horsepower per inch of roll face" And then switching the subject back onto mill construction, he continued, "Carnegie Steel's going to build one at McDonald, O.—at least it has one authorized. Then I'm told three more are being contemplated, all 56-inch mills—one by Republic Steel Corp. for installation at the Corrigan-McKinney plant in case the merger is consummated, one by Bethlehem Steel Co. at Buffalo and one by Great Lakes Steel Corp., Detroit."

"That doesn't leave many large steelmakers without broad sheet mills, does it?" I asked.

"No," said he, "most of 'em have 'em. Let's see," and taking his memo book I watched him write: American Rolling Mill, 66 inch; Weirton Steel, 48 inch; Wheeling Steel, 54 inch; Otis Steel, 66 inch; and, Inland Steel, 69 inch

Using his pencil as a pointer he ran down the column of figures representing the width each mill would roll and he said, "All these mills will handel these widths in 14 gage and heavier, anyway. That's five already built, isn't it. Then there's two more building, one authorized and three being considered. That's 11 all-told. Boy, I don't know what they're going to do with them all, but there they are with a potential capacity of 6,336,000 tons annually, based on a daily output of 2000 tons and a 24-day month."

"No doubt new applications for steel will be found to satisfy a large part of the tonnage coming off these mills," I said.

"Yes," he replied, "the steel house in all probability will take up some of the slack. One steelmaker, I'm told, is talking about a 100-inch mill. In fact, an automobile bodymaker already has installed two 100-inch presses looking forward to the day when he can feed 100-inch sheets."

"It seems to me the extras for width on broad sheets will be so exorbitant that buyers will hesitate to show much interest, don't you think," I said.

"Right now" said he, "extras for width on 100-inch stock might prohibit their use. But that isn't all. You take rolls such as you see turning over there in their bearings," he continued pointing to the mills in front of us.

"They're 60 inches wide and the moment you go to rolls a foot or so wider, say 76 inches, right away you increase your roll cost at least 250 per cent. Now don't misunderstand me. I don't mean to say that the 100-inch mill isn't practical. I'm merely saying that we're not just ready for it yet, that's all."

At this stage of our conversation, my friend received word that he was wanted on "long distnace." With a friendly "So long," he headed for the heating furnaces, rounded the corner and soon was out of sight.

My eyes followed him until he disappeared through the doorway. Then I arose and directed my way toward the finishing end where I could watch more closely the disposition of the finished product rolled on a broad sheet mill.

# Industrial Men in the Day's News

## Melvin Pattison, New President, Industrial Brownhoist Corp.

As a young man he started work clerking in a wholesale coal yard in the Chicago territory.

Since 1901 he has been active in sales and managerial capacities with the Brownhoist Corporation.

In his several years as executive vice president he has become well equipped for his new position.

MELVIN PATTISON, who as noted in STEEL for Sept. 24 has been named president of the Industrial Brownhoist Corp., Bay City, Mich., has been associated with this company and its predecessor for well over 30 years.

Without the benefits of a college education he started to work as a young clerk in Cox Bros. wholesale coal rail yard; the company mined Lehigh anthracite coal and later was sold out to the Lehigh Valley Coal Co.

Mr. Pattison became connected with the western branch of the business with headquarters in Chicago. After a time he was advanced to foreman and then superintendent of one dock; after about four years he was appointed general superintendent of all the company's wholesale yards and docks in Chicago and Milwaukee. He also spent a short time in the sales department of the organization.

July 1, 1901, he was appointed salesman of coal-handling machinery for the Brown Hoisting Machinery Co., Cleveland, later becoming general manager of sales. When A. C. Brown was elected president of the company, Mr. Pattison was elected vice president and general manager, in which position he continued until consolidation of the company with the Industrial Works at Bay City, when the title of general manager was abolished and he was named executive vice president.

All manufacturing operations of the company in Cleveland were moved to Bay City in 1931, although the Cleveland plant was maintained for certain administrative and sales functions.

□ □ □

J. J. Byrne has been appointed sales representative at Cleveland for Empire Sheet & Tin Plate Corp., Mansfield, O., succeeding Glenn D. East, who has resigned to become associated with Wheeling Steel Corp., Wheeling, W. Va.

□ □ □

James M. Darbaker, master mechanic of the Gary, Ind., sheet mill of American Sheet & Tin Plate Co. for the past two years, has been named general manager of the plant, succeeding John A. Gross, who will enter a specialized sales field for the company. Mr. Gross has been active in the steel production field since 1890.

□ □ □

H. P. McCann, formerly president and general manager of the McCann-Harrison Corp., Cleveland, recently has become associated with the C. O. Bartlett & Snow Co., of that city. During the past 18 years he has been identified closely with the development and manufacture of large continuous industrial furnaces, as well as air heating equipment for baking and drying ovens, space heating and the like.

□ □ □

Victor G. Vaughan, until recently manager of the appliance engineering division of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is now associated with the Spencer Thermostat Co., Attleboro, Mass., where he has charge of all operations, including development of new products.

□ □ □

Carl W. Schuchardt, general manager of Pyramid Equipment Co., Milwaukee, has been elected president of the P. W. Mfg. Co. Inc., Milwaukee, manufacturer of dust control equipment and systems for use by coal dealers.

□ □ □

H. V. Glunz has been appointed general manager of operations of the Ohio Ferro-Alloys Corp., Canton, O., effective Oct. 15. He is a graduate of Ohio State university and has had broad experience in the production of quality alloy steels.

□ □ □

G. R. Scanland has been elected chairman of the executive committees of Shippers Car Line Corp., American Welding Co. and Acme Tank Car Corp., subsidiaries of American Car & Foundry Co., New York. He succeeds W. M. Hager.

□ □ □

V. L. Conley, assistant district manager of the Cleveland sales district for American Rolling Mill Co., Middletown, O., has been transferred to the Pittsburgh district to function as assistant district manager in charge of the new Buffalo sales office, Seventeen Court Street building, Buffalo.

V. L. Conley

A. W. Bryant, with headquarters at Rochester, N. Y., will assist Mr. Conley.

□ □ □

H. G. Batcheller, president of the Ludlum Steel Co., Watervliet, N. Y., has been elected a director of the

New York State National bank, Albany, N. Y., succeeding the late Edward Corning, chairman of the board of Ludlum.

William C. Dearstine, president of the Albany Hardware & Iron Co., also was named to the bank's decorate.

□ □ □

Roger W. Andrews, until lately assistant to the president of the Blaw-Knox Co., Pittsburgh, has been appointed western manager for a new sales division of the Combustion Engineering Co. Inc., New York. The new western division will include the Chicago, Detroit, Indianapolis, St. Louis, Kansas City, Mo., Houston, Tex., Tulsa, Okla., Minneapolis and Denver offices. Mr. Andrews' connection with the steam power field dates to 1910, when he joined the Northern Equipment Co., later becoming sales engineer, service engineer, chief engineer, secretary and general sales manager. In 1914 he formed the R. W. Andrews Co., of Chicago, handling power plant equipment, and a year later joined with Grant D. Brawshaw, then steam engineer of the Cambria Steel Co., to form the Andrews-Bradshaw Co., with headquarters in Pittsburgh. The latter merged with Blaw-Knox.

Roger W. Andrews

□ □ □

Gilber W. Froelich, for six years with the Red Spot Paint & Varnish Co., Evansville, Ind., has been made advertising manager and pricing head of the Mid-States Steel & Wire Co., Crawfordsville, Ind.

□ □ □

Richard F. Ball, secretary, American Bridge Co., Pittsburgh, has retired through operation of the United States Steel Corp.'s pension plan for employes of subsidiary companies. He has been with the American Bridge since 1901. Employes tendered him a testimonial luncheon at Pittsburgh, Oct. 18.

# Died:

CARL V. DODGE, vice president and manager of sales of rolls and steel castings for United Engineering & Foundry Co., Pittsburgh, in that city, Oct. 16, after a prolonged illness. Identified with the United Engineering for 30 years, he began his career as a shipping clerk in the foundry department at Vandergrift, Pa., became a salesman in the Pittsburgh office in 1913, and was elected vice president in charge of roll and steel casting sales in April, 1933. He was also a director.

□ □ □

Elmer E. Arensberg, 64, president of the McCullough Dalzell Crucible Co., Pittsburgh, in that city, Oct. 18.

□ □ □

M. Ryan, 41, associated with the Detroit sales office of the Bethlehem Steel Co., in that city recently. He had been connected with Bethlehem for 25 years.

□ □ □

Francis Mills Case, 59, Cleveland consulting engineer for over 30 years and president of the Case Engineering Service Co. for 20 years, at his home in Cleveland Heights, Oct. 18.

□ □ □

Israel Platt Pardee, 72, for many years president of the Hazleton Iron Works, Hazleton, Pa., and previously identified with other iron and steel companies, at his home in Hazleton, Oct. 14.

□ □ □

Franklin L. Alcott, 78, vice president and director of the American Stove Co., Cleveland, and its predecessors for half a century, at his home in Shaker Heights, O., Oct. 18, after a long illness.

□ □ □

Alfred Crook, 60, president of the Lansdowne Steel & Iron Co., at his home in Lansdowne, Pa., Sept. 29, after an illness of several years. At one time he was an executive for the Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

□ □ □

Arden B. Holcomb, 50, manufacturers' agent at Pittsburgh for several engineering concerns, in Pittsburgh, Oct. 9. He had studied electrical engineering at the Polytechnic institute, Cornell university, and later at Carnegie Institute of Technology.

□ □ □

Henry S. Pritchard, retired, but at one time associated with the metallurgical department of American Bridge Co., in Pittsburgh, Oct. 17. He was a member of the American Society of Civil Engineers, and a fellow of the American Association for the Advancement of Science.

□ □ □

Nels P. Flodin, 71, for 44 years connected with the Lake Shore Engine Works, Marquette, Mich., in that city, Oct. 15, after a year's illness. He was a charter member of the Lake Superior Mining institute and was responsible for the development of many machines widely used in iron ore mining.

□ □ □

Franklin M. Bowman, 64, vice president of the Blaw-Knox Co., Pittsburgh, at his home in that city, Oct. 12, as noted briefly in STEEL for Oct. 15. A graduate civil engineer from Toronto university, Toronto, Ont., he later became connected with the Riter-Conley Mfg. Co., where from 1892 to 1912 he was successively chief draftsman, chief engineer, director and secretary, resigning to become associated with Blaw-Knox. For the latter he was in charge of the transmission tower and structural steel divisions.

Carl V. Dodge

□ □ □

Michael M. O'Shaughnessy, 70, for 20 years city engineer of San Francisco and originator and promoter of the $86,000,000 Hetch Hetchy water project for that city, in San Francisco, Oct. 12, almost on the eve of the celebration (Oct. 28) to mark the turning of the Hetch Hetchy water into the city's reservoirs.

□ □ □

Ralph E. Parks, 44, superintendent of all reduction works for the Aluminum Co. of America, at West Penn hospital, in Pittsburgh, Oct. 13. He was a native of Saugatuck, Mich., a graduate of Purdue university, school of chemical engineering, and first became associated with the Aluminum company in 1913 at Niagara Falls, N. Y. Subsequent promotions took him to the company's plants at Alcoa, Tenn., Baden, N. C., and for a period he was located at Tyssedal, Norway, and Arveda, Que. He returned to Pittsburgh in 1930.

# EDITORIAL

## Revamped NRA Should Retain Open, Firm Price Policy

THOSE who succeed General Johnson in directing the activities of NRA are well advised in announcing that they will go slow in changing the price policies of that important government agency. The influence of price penetrates so deeply into the roots of industry that NRA's administrators should be doubly sure they are right before they authorize any change that would upset existing market conditions.

One reason for NRA's difficulties in regard to price provisions in codes of fair competition is that commonly used terms are misunderstood. Herman H. Lind, general manager of the National Machine Tool Builders' association, explained this confusion accurately in his recent annual report to that association when he said:

> "It is regrettable that the the fundamental difference between 'open, firm price policy' and the 'fixing of prices' is not understood and that they are treated by newspaper writers as one and the same thing. Surprisingly, there are others also who do not differentiate between 'open prices' and 'fixed prices.' There is misconception within NRA itself and even among business men. . . . People do not seem to understand that the open price is a price established by an individual enterprise which then becomes that enterprise's *one* and *only* price to all customers."

### Public Given Erroneous Impression That Codes Encourage Price Fixing

Only a few of the existing codes contain provisions that could be designated accurately as permitting price-fixing. About half of the codes provide for open prices. Notwithstanding these facts, the emotional tirade against NRA price policies has been couched in such language as to give the public the impression that most of the codes condone the fixing of prices. Moreover, the issues have become so involved by the loose talk of certain critics that many people believe that higher prices under code functioning constitute *prima facie* evidence of unwarranted collusion on prices.

This is an unfortunate surmise. The fact is that for every instance in which higher code prices can be blamed upon outright price-fixing, there are scores of cases wherein the increase in prices can be traced to the combined effect of minimum wages and maximum hours, and to numerous other restrictive measures of NRA codes. In several industries, the adoption of uniform extras has been condemned as the equivalent of price-fixing. Under certain conditions, uniform extras have served to increase prices to certain groups of buyers, but in most cases the increase is due more to the fact that legitimate extras were waived by sellers prior to NRA than to any concerted attempt by sellers to raise prices through the agency of extras.

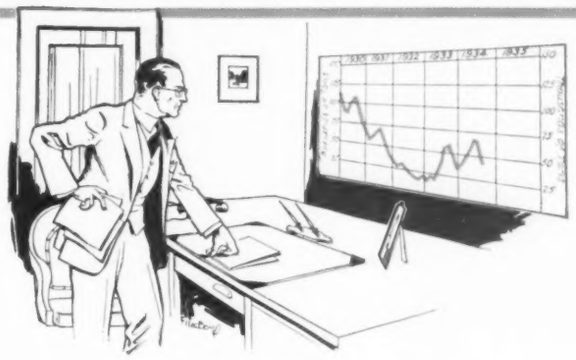
To understand the price problem, one must lay aside theories of the ideal and confine one's thoughts to practical considerations. In practice, there are two extremes. One is the condition of utterly free competition, in which the law of supply and demand is the ruthless master. The other is the condition of price-fixing or price control, carried on under government supervision for the purpose of protecting the public interest. Everyone will agree that under present circumstances there are grave potential dangers in both extremes. Unlimited competition would lead to business suicide in many industries. On the other hand, too much support for price-fixing would freeze prices at too high a level, strangle demand and thus retard recovery. Obviously the practical solution is a policy which lies somewhere between the two extremes.

### Putting Price Information Into the Open Halts Malpractices of Buyers and Sellers

In our opinion, the best approach to the problem lies in unwavering adherence to the principle of open, firm prices, with a minimum of regulation or restriction by the government. Exposing price information to the light of day is one of the simplest preventives of the sharp practices which have been condemned by extremists on both sides. It makes it more difficult for buyers and sellers to indulge in secret concessions, rebates, and similar acts which have bred suspicion in the past. It serves to curb the sellers who occasionally try to "break" the market to spite a competitor. Likewise it provides the means of combating the trick employed now and then by a few buyers of playing one bidder against other real or visionary bidders to the detriment of the principle of firm bids.

Unfortunately the success of open, firm prices depends upon complicated machinery, which differs for every commodity and every industry. Various designs of such machinery are being tested in existing NRA codes. The experience now accumulating is extremely valuable—so much so that NRA should go slow in making sweeping changes which would destroy the lessons which undoubtedly lie in the price administration of the past year.

# THE BUSINESS TREND



## Business Trend Is Uncertain In Pre-election Period

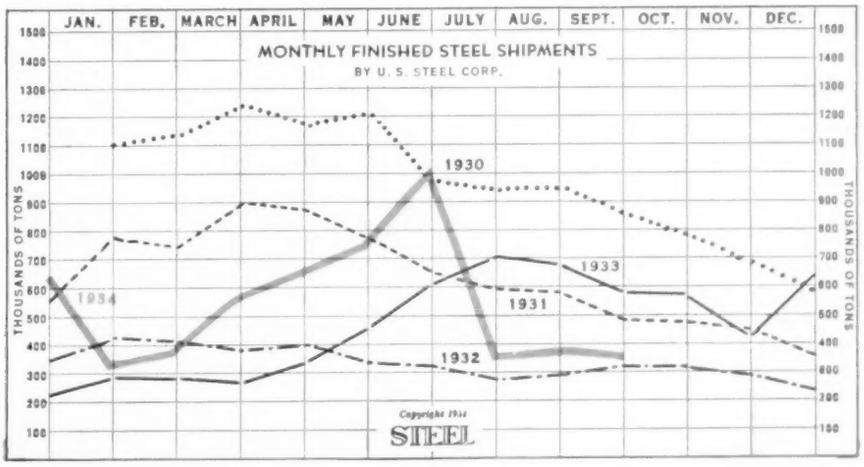
BUSINESS activity is in the listless state which seems to have become the standard pattern for pre-election periods. Some of the characteristics of the present situation are reminiscent of the hesitancy which prevailed in October, 1932.

Current indexes show slight recessions since early in October. In most cases the curve of activity showed the well known decline from May to early September, a leveling off in the first half of September, and a barely perceptible upturn in the last half of that month. Thus far in the tenth month the trend has been indecisive, although the weight of the most recent statistics seems to be forcing the line slightly downward.

Steel operations, which for several weeks have been barely holding their own, are off a trifle. The last report on revenue freight car loadings showed a moderate decline, whereas the preliminary figures had indicated that no change or only a slight change from the previous week would be recorded. Electric power output for the week ending Oct. 13 was down from the preceding week, but was 2.3 per cent above the corresponding figure for last year.

### Constructive Statements of Richberg Helped Sentiment, But Price Talk Puzzled Business

Business sentiment was buoyed somewhat by the reassuring statements of Donald Richberg and others. However, there are signs that the new dealers may have over played their hands in their efforts to reconcile business critics. The olive branch has been extended so frequently in recent weeks that in some quarters observers are beginning to wonder what is behind the sudden change of attitude. The President's statement in regard to higher prices, followed by the odd reference to inflation by Senator Bulkley, caused a flare-up, the reaction from which was not wholesome to business under present circumstances.

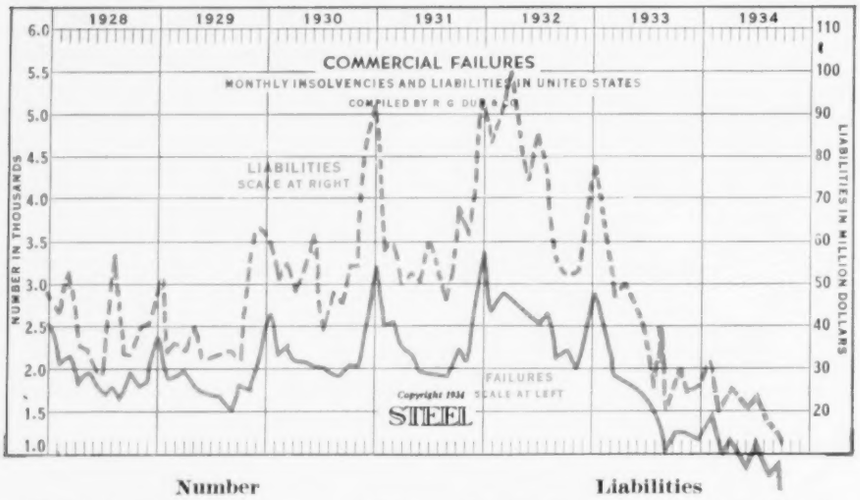



**1934**

| | Tons |
|---|---|
| Sept. | 370,306 |
| Aug. | 378,023 |
| July | 369,938 |
| June | 985,337 |

**1933**

| | Tons |
|---|---|
| Sept. | 575,161 |
| Aug. | 668,155 |
| July | 701,322 |
| June | 603,937 |


COMMERCIAL FAILURES
MONTHLY INSOLVENCIES AND LIABILITIES IN UNITED STATES
COMPILED BY R. G. DUN & CO.
LIABILITIES SCALE AT RIGHT
FAILURES SCALE AT LEFT
NUMBER IN THOUSANDS
LIABILITIES IN MILLION DOLLARS
1928 1929 1930 1931 1932 1933 1934
Copyright 1934 STEEL

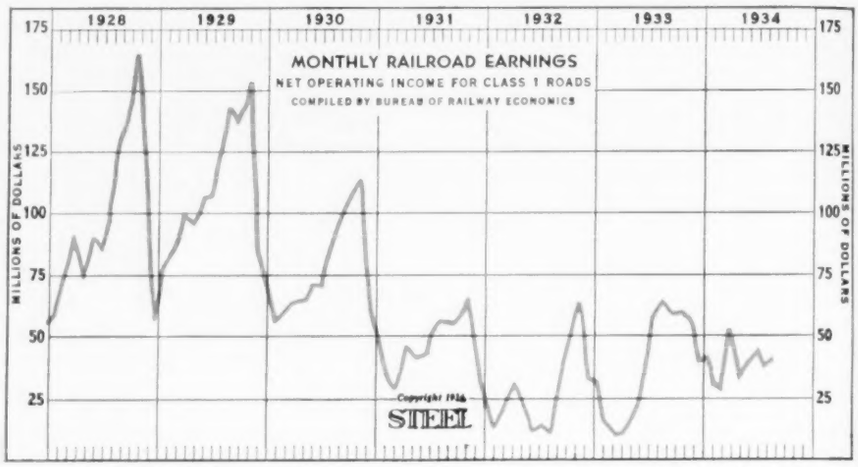
| | Number | | Liabilities |
|---|---|---|---|
| September, 1934 | 790 | September, 1934 | $16,440,147 |
| August, 1934 | 929 | August, 1934 | 18,459,903 |
| September, 1933 | 1116 | September, 1933 | 21,846,906 |

### September Business Failures Lowest in Many Years

The September record of business failures shows a continuation of the remarkable downward trend. According to figures issued by Dun & Bradstreet, failures in September numbered only 790 which compared with 929 in the preceding month and 912 in July, the latter figure being the previous low for many years. The September record is in sharp contrast to that of 1933 when 1116 firms were added to the mortality list. Liabilities in September totaled $16,440,147 compared with $21,846,906 in September, 1933.

### Railroads Earn 1.39 Per Cent On Investment in August

Net operating income of Class I railroads during August amounted to $39,677,337, which was at the annual rate of return of 1.39 per cent on their property investment. The earnings report for August shows a slight upturn from the $35,220,889 income of the preceding month. In August, 1933 net operating income was $61,401,986. According to Dr. Julius H. Parmelee, director, bureau of railway economics, 67 per cent of the railway mileage of the country is being operated at a loss.


MONTHLY RAILROAD EARNINGS
NET OPERATING INCOME FOR CLASS 1 ROADS
COMPILED BY BUREAU OF RAILWAY ECONOMICS
MILLIONS OF DOLLARS
1928 1929 1930 1931 1932 1933 1934
Copyright 1934 STEEL

| | |
|---|---|
| August, 1934 | $39,677,337 |
| July, 1934 | 35,220,889 |
| August, 1933 | 61,401,986 |

INDEX OF MACHINE TOOL ORDERS
AVERAGE MONTHLY SHIPMENTS 1926=100 PER CENT
COMPILED BY NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
PER CENT
1928 1929 1930 1931 1932 1933 1934
Copyright 1934 STEEL

| | Per Cent |
|---|---|
| September, 1934 | 37.4 |
| August, 1934 | 37.1 |
| September, 1933 | 30.9 |

### Machine Tool Orders Down Slightly in September

The sharp increase in volume of new business placed in the machine tool industry during August failed to carry over into September, the order index dropping from 41.4 to 36.2, according to the National Machine Tool Builders' association. While the September figures are a disappointment, there still remains some margin over the low summer months, sufficient to stop the downswing of the 3 months moving average recorded on the accompanying chart, which advanced slightly from 37.1 to 37.4 in September. In September, 1933 this index was 30.9.

# VOTING MACHINES— FROM MODEL STAGE TO PRODUCTION LINE

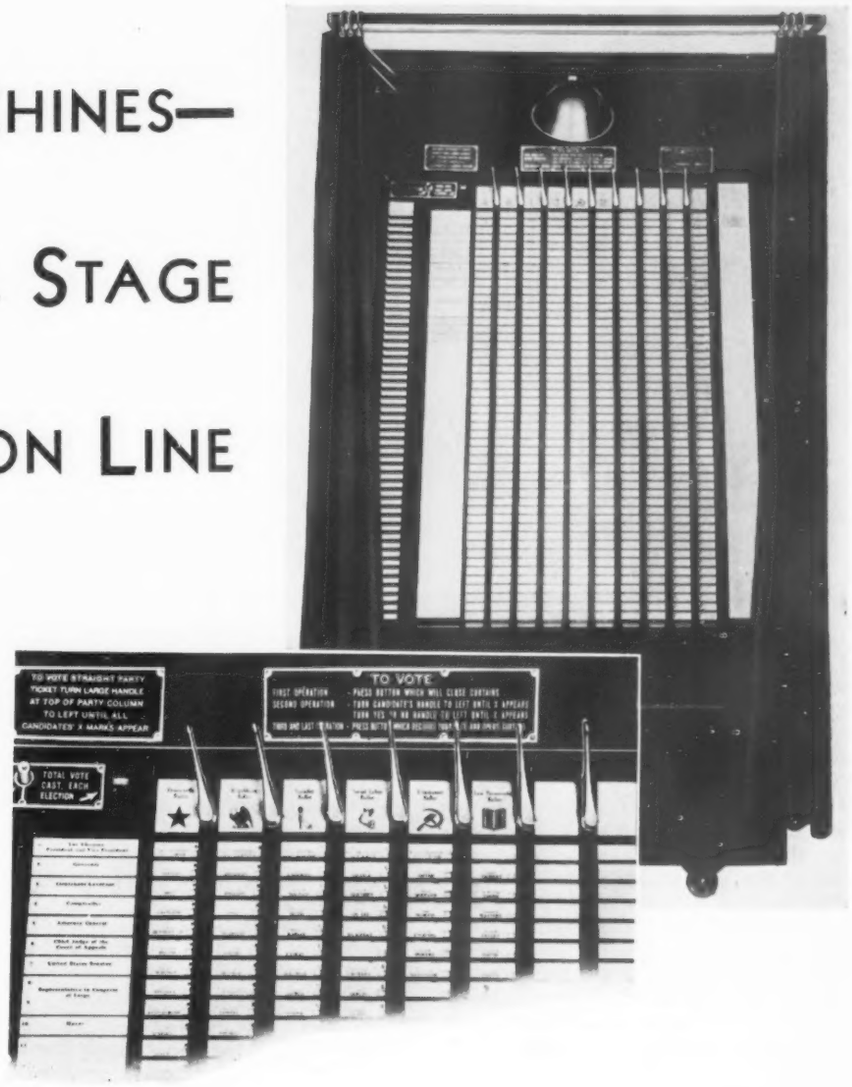

TO VOTE STRAIGHT PARTY TICKET TURN LARGE HANDLE AT TOP OF PARTY COLUMN TO LEFT UNTIL ALL CANDIDATES' X MARKS APPEAR
TO VOTE
TOTAL VOTE CAST, EACH ELECTION

*FIG. 1—A nine-party 50-candidate electrically operated voting machine, recently built for use in Philadelphia. The machine comprises about 17,000 parts. Fig. 2 (inset)—A closeup of the ballot face. In addition to the large handles for voting straight tickets, there are small handles opposite each name for voting split tickets*

A NOTABLE recent achievement in the field of steel fabrication is the design and production of a new voting machine. An idea of the scope of this undertaking is revealed by a few statistics. The machine comprises approximately 17,000 parts, which are combined into some 150 subassemblies, and these into 13 major assemblies.

In production, the work of 300 men is involved, 22 presses and 12 power brakes are employed, as well as a good deal of miscellaneous equipment such as straightening rolls, spot welders, arc welders, oxyacetylene welding apparatus, case-hardening equipment and the like. For making the various parts, many of which are duplicates, 750 dies and jigs are required. Plating, lacquering and rustproofing operations are involved. Numerous parts and materials go into the machine, such as those produced by automatic screw machines, malleable castings, an electric motor, gear wheels and pinion, curtains and curtain ropes, and others.

The manufacturer and distributor of this new machine, known as the Shoup voting machine, is the General Sales Engineering Corp., Philadelphia. This Corporation recently has entered into a long term contract to have the machines manufactured for it by the Berger Mfg. Co., Canton, O., a division of the Republic Steel Corp.

The new machine is constructed for a single purpose, as are many other mechanical structures such as adding machines and typewriters. From a design point of view, voting on this machine is the same as voting on the familiar Australian paper ballot almost universally used in the United States and, naturally, carries with it the simplicity of that type ballot. The voter can be taught how to cast his ballot properly in a few minutes, and it requires no more intelligence on the part of the voter to cast his ballot with this machine than with the customary paper ballot. In marking the ballot the voter does so in identically the same manner that he has followed heretofore with the paper ballot. However, instead of using a pencil to produce the X mark by each candidate's name, with the Shoup voting machine he turns a small lever, one of which is placed directly

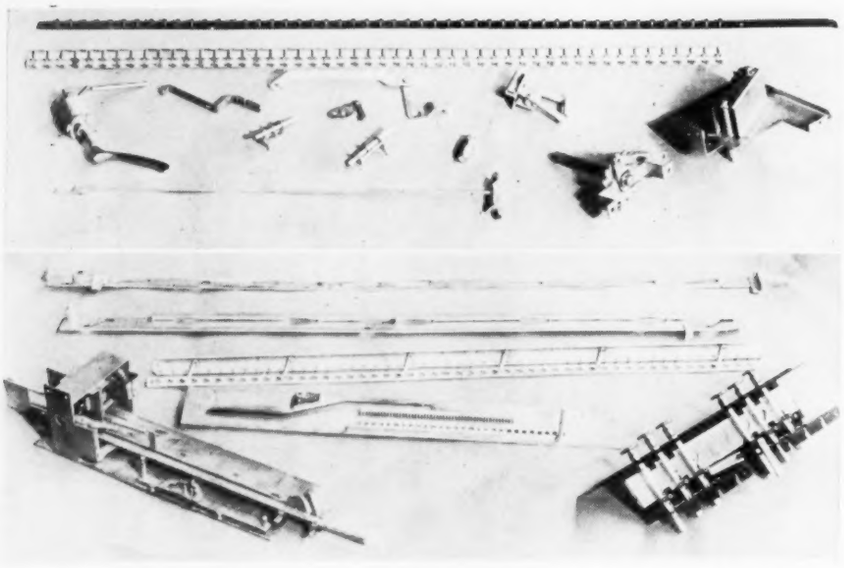


*Fig. 3 (above)—Assortment of subassemblies, of which there are some 150 entering into construction of the machine. Fig. 4 (below)—Assortment of several major assemblies, of which there are 13 in the machine*

opposite each candidate's name.

The machine is designed and constructed so that it is physically impossible for a voter to cast an improper ballot. It is also physically impossible to tamper with the machine or to alter the returns without that fact being detected instantly. In less than one minute after the polls have closed, by the insertion of keys and the proper operation of the machine, the complete tabulated returns appear on the face of the machine directly under each candidate's name.

In other words, it is a highly complicated and skillful engineering achievement which does a single, complete job in an exceedingly simple way. In addition, it had to be built with extreme accuracy to guard against faulty operation and still have sufficient ruggedness to withstand any shocks. Proper surfacing to resist the effects of dampness while in storage between elections also was essential.

### Original Design Improved

The machine originally was invented and patented by S. R. Shoup. In recent years, additional patents and improvements were made by Mr. Shoup and his son, R. F. Shoup, who at present is chief engineer of the General Sales Engineering Corp.

About three years ago two handmade models of the machine that had required many years of labor and effort to produce were delivered to the Berger plant at Canton. These models were of a 9 party-30 candidate machine. As larger municipalities call for machines of a 9 party-50 candidate size, in order to accommodate all of the candidates and all of the various parties on one ballot, this involved a redesigning of the machine to be able to produce the larger machine and still stay within the restricted dimensions to produce a machine practical for the voter to use. It was also the intention to produce a machine that had the appearance of a paper ballot insofar as it was humanly possible. It was intended to produce all of the necessary dies, jigs and fixtures prior to going into production.

For this reason, when the machines arrived at the plant, it was necessary to study them from two standpoints. One involved the selection of materials, the definite shape and measurements of each part, the ruggedness of each part and the clearance between parts, all from the standpoint of foolproof operation of the machine. Another involved the design of the parts so that they might be manufactured and assembled on a production basis. Study from these two standpoints resulted in many changes from the construction of the original hand-made models, and took many months' time on the part of a division of the Berger engineering staff which was assigned to this task under the direction of A. F. Foehrenbach of that staff, co-operating with Mr. R. F. Shoup who was stationed at the Berger plant.

### Parts Inspected Carefully

It was this study which dictated the choice of materials of construction, the design and type of dies, the selection of equipment on which the work was to be done, and the setting up of an extensive inspection system in three divisions to check each part, each subassembly and each major assembly as to accuracy, finish, etc.

The various illustrations show the actual production of a run of five hundred 9 party-50 candidate electrically operated machines being manufactured for the city of Philadelphia for delivery there at the coming election, Nov. 6.

Practically all parts in this voting machine are of steel in the form of cold-rolled sheet, strip, bars, bands and flat wire. All this is plain carbon steel, excepting that higher carbon content is used for some of the wearing parts. A supply of steel sufficient to suport continuous production is maintained in a warehouse adjoining the fabricating department, and brought into the latter, as needed, by means of tractor trucks. All buildings are provided with woodblock floors, making it easy to transport with tractor trucks.

In the shop, the first operation is to pass the flat material through

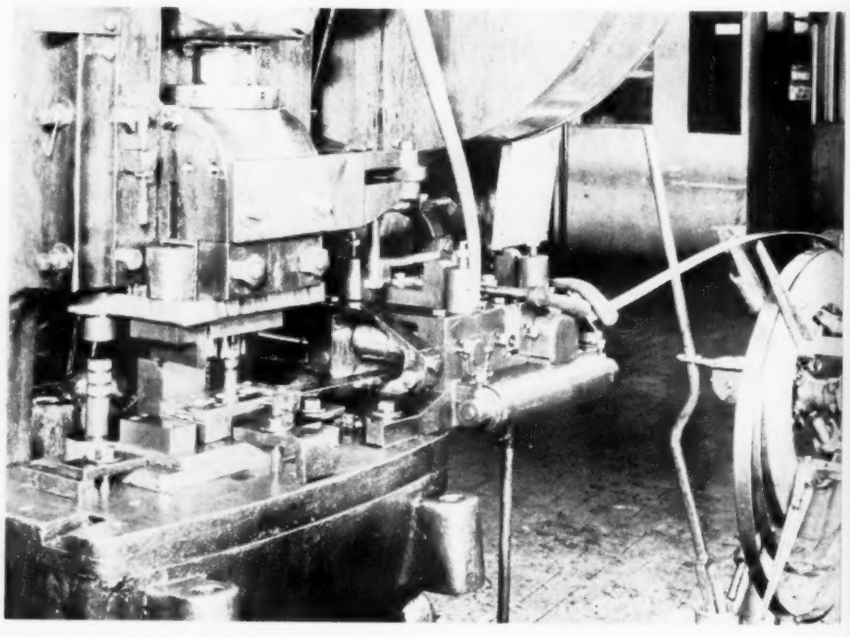


*Fig. 5—Punch press with automatic roll feed, making butterflies at the rate of 6000 per hour from cold-rolled strip steel*

stretcher and roller levelers to flatten and straighten it. The material is then cut to size, either in blanks or strips depending on the shape of the finished piece, or the die provided for its processing. These blanks then are hauled to the press room for operations that range from simple notching to mutiple notching, compound blanking, gang-punching and power brake work.

### High-Speed Press Work

As an example of operations in the press room, an automatic punch press, shown in Fig. 5, produces butterflies, 1000 of which are required for each machine. These butterflies, when installed in the voting machine, serve the purpose of limiting the rotation of the voting spindle so that the handle operated by the voter reaches the end of its travel when the voter's choice has been indicated on the face of the machine and is ready to be recorded. This press has special compound dies, stock being coiled cold-rolled strip steel, 1½ inches wide, and mounted on a reel. The butterflies are produced at a rate of 6000 per hour.

The press is equipped with a scrap cutter and the punchings feed out separately through a chute. It also is equipped with a combination roll straightener and feed device, so that the coiled material is straightened before blanking. Dies on this machine produce 80,000 to 90,000 blanks before regrinding is necessary. This machine, like others in the press room, is individually motor-driven through multiple vee-belts.

Small power brakes, underdriven by individual motors, largely are used for multiple punching and light bending and forming operations. One such machine is used for punching countershifter bars, as illustrated in Fig. 7. These countershifter bars, when installed in the voting machine, operate the pinion shifting mechanism which positions the transfer pinion in the vote-counting mechanism. The blanks are 3/32-inch cold-rolled flat wire, 24¾ inches long and 7/16-inch wide; 12 holes 0.169-inch in diameter are punched in them at one stroke.

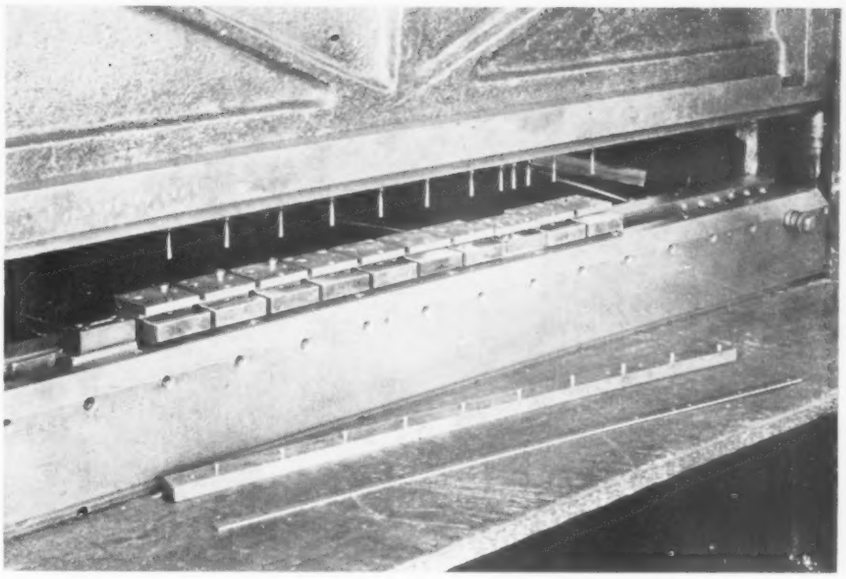


*Fig. 7—Punch brake, engaged in punching shifter bars which operate the pinion shifting mechanism which, in turn, positions the transfer pinion in the counting mechanism. Necessity for extreme accuracy holds production to 210 pieces per hour*

The holes are punched on individual dies accurately spaced in a holding shoe by means of a master gage drilled on a jig borer and having hardened inserted pins which enter the dies and provide for accurate location. The punches are held in by set screws in a continuous shoe in the top ram of the brake. The piece to be punched is inserted in a slot between the stripper and the die, the stripper being designed to form a back-gage as well as to strip the piece off the punches. Accuracy is extremely important in this machine, so that ample time is given to the operators for placing the piece squarely against the back of the gage; thus the production on this operation is limited to an average of about 210 pieces per hour.

After leaving the press department, the blanks are transferred to the brake department for further forming. Such parts include all the parts of the cabinet itself, including sides, doors and center plate, as well as all mechanical parts of the machine.

### Tolerance Only 0.001-Inch

The center plate is the foundation of the entire machine and is the chassis on which is mounted all the operating mechanism of the voting machine. It is produced on a heavy-duty power brake in a multiple punch die with holes drilled in a jig borer to insure accuracy. This die, shown in Fig. 8, is designed for punching holes to an accuracy of 0.001 inch. Gage bars at both sides have 10 notches each, for positioning the piece. After having been punched, the center plate is bent with a Z-offset. Instead of using one bend for an operation of this kind, this bending is accomplished on four sets of dies mounted in power brakes. The offset is one of 1½ inches and it is absolutely essential that the distance between the offset to the holes on both sides of the offset be maintained within 0.003-inch. The first operation locates the two bending lines and starts the deformation. The second and third operations result in two

*Fig. 6—Handle return frame welding jig, vertical members of the frame being formed channels with slotted webs; horizontal members have diagonal slots. All the slots afford clearance for adjoining moving parts*

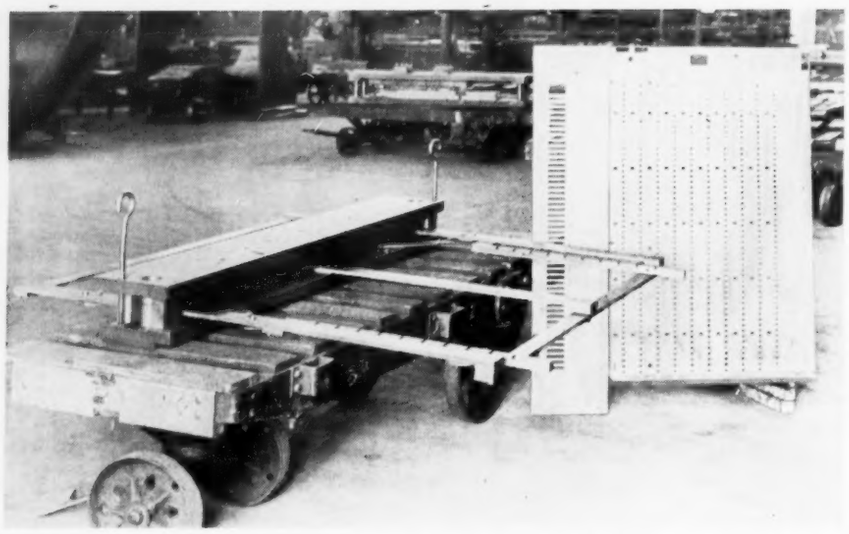


*Fig. 8—Center plate die for forming the chassis on which the entire voting mechanism is mounted. This die is mounted in a power brake and is designed for punching holes to an accuracy of 0.001-inch. Gage bars at the sides have ten notches each, for ten punching operations. A punched center plate stands at the right*

bends to make the Z-shaped offset. The fourth operation is performed in a sizing die to bring both sides of the offset strictly parallel with each other. The center plate is 42 inches high and 42 inches wide and is made from 16-gage cold-rolled sheet steel.

A complicated part is the handle return frame, shown in Fig. 6. It is the device by which the voting handles, after a vote has been indicated and recorded, are returned to normal so that the next voter may use the machine. Vertical members of this frame are channels formed from cold-rolled strip, and with slots cut out of the back of the channels. Horizontal pieces also are cold-rolled strip into which slots are cut diagonally. These slots afford clearance for adjoining moving parts of the machine.

### Special Jig Designed

So accurate must this frame be, so as to return any or all of the handles used in voting, that it must be within a tolerance of 0.002-inch throughout. Members of these frames are assembled in a special jig and are welded. This jig, also shown in Fig. 6, is machined out of a solid rolled steel plate 3 x 4 feet and 2¼ inches thick. It is equipped with a pan for water cooling. After welding and cooling, this frame is hand-straightened to gages in a straightening jig in the toolroom to remove any warping that may have occurred in the welding.

Each voting machine is equipped with 9 party columns and one "question" column. Each of the 9 party columns has at the top of the column a straight ticket handle. These are annealed malleable castings for toughness and resistance to breakage.

The machine is built in three sizes: 9 party-30 candidate; 9 party-40 candidate, and 9 party-50 candidate. Thus the 30 candidate machine is equipped with 300 small voting handles; 270 of the handles, namely 30 for each of the 9 columns, are for voting for individual candidates. The other 30 are in the tenth column and for voting "yes" or "no" on such questions as may be submitted to the voters. In turn, the 40 candidate machine is equipped with 400 small voting handles and the 50 candidate machine is equipped with 500 small voting handles.

All of these handles are made from cold-rolled strip steel in a progressive die in a punch press, one handle being produced per stroke. Output on one set of dies before regrinding became necessary was 103,000 pieces. These handles are placed over the ends of voting handle spindles and riveted in place by upsetting the ends of the spindles in a standard high-speed power riveting machine. These spindles are screw machine products and purchased from an outside source.

### Weights Are Compared

The 9 party-50 candidate machine has a total weight of 830 pounds. The weight of the 40 candidate machine is approximately 780 pounds, and the weight of the 30 candidate machine is approximately 730 pounds. With the exception of the electric motor, electric wiring, curtains, curtain ropes and some other minor parts, the entire construction is of steel. Most parts are of cold-rolled sheet and strip, ranging from 22 to 10 gage. The average gage used in the construction of the cabinet is 16 gage.

Dies are made at this plant from two types of steel. Most are produced from the best grade of oil-hardening tool steel. A number of the main dies, subjected to heavy duty and producing parts where the need for accuracy is especially pronounced, are made from high-carbon, high-chromium die blocks. The latter are estimated to have two to three times the life of the former in service. Whereas the tool steel dies are heated to about 1550 degrees Fahr., the high-carbon, high-chromium steel is brought slowly to 1750 degrees and the blocks kept at that point for 3 hours. They are removed from the furnace and cooled in an air blast, after which they again are drawn to remove strains. All dies are held to close tolerances, usually not more than 0.002-inch and frequently less than 0.001-inch. All dies are mounted on leader pin die sets for accuracy of the work. They are lubricated by an ordinary soluble cutting compound to which a certain amount of graphite is added.

Many of the voting machine parts are given a case hardening treatment at the plant to increase wear resistance.

Much welding is done in making subassemblies and major assemblies for these voting machines. The welds are mostly spot welds, but some arc welding and oxyacetylene welding also is done. The welding is done in a separate department, and the welded parts are then returned to the assembly benches for further assembling. The cabinet, an assembly of 14 major and numerous additional minor parts, is spot welded in jigs in the welding department, after which the corners and edges are closed by gas welding, thereafter being ground for a smooth finish. The cabinet handles are bolted on.

### Given Rustproof Treatment

Because it is possible that voting machines may be stored in damp warehouses between elections, the manufacturers have taken no chance of deterioration due to rusting. All interior parts are cadmium plated or parkerized. All exposed bright parts are plated, chromium over nickel over copper. The cabinet is coated inside and outside with black enamel which is baked.

A thoroughgoing inspection system is one of the most important factors in the manufacture of these voting machines. This is for the purpose of checking the accuracy of all manufactured parts. Each piece must be inspected—a job that assumes vast proportions in view of the large number of parts involved.

In the same way, each minor assembly and each major assembly are subjected to an inspection. This is followed by an inspection at each station on the line of production.

The 150 subassemblies and 13 major assemblies are made at some 75 stations, mainly on benches. The 13 major assemblies, after completion, are stored in racks adjacent to the production tracks which are four

abreast. Each has 11 stations. At the first station, the cabinet, received from the welding and paint shops, is mounted on casters which are placed in the tracks. These are simply steel channels set on the wood block floor with the open end up. Electric motor, switches and wiring are installed at this station.

At station No. 2, the main interlocking system is assembled and the vertical interlocking device installed. These two form the basis of the control of the complicated voting mechanism.

At station No. 3, the personal choice and primary voting mechanisms are installed.

At No. 4, the main operating mechanism is installed; this, through pinions, rack and cams, operates the vote recording mechanism.

At No. 5, the counting or registering mechanism is installed.

At No. 6, the voting handles and the mechanism that directly controls the vote are installed.

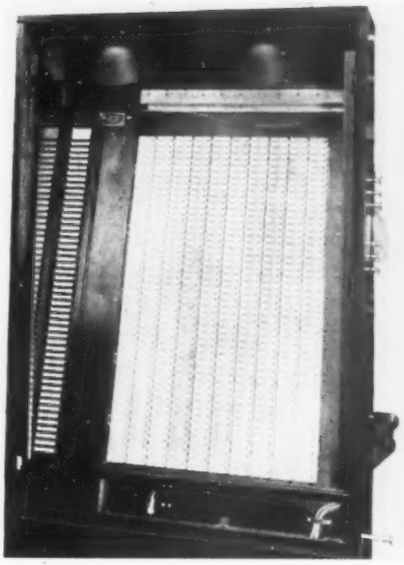
At No. 7, the operations are supplemental to those at No. 6.

At No. 8, the instruction plate is placed on the machine.

At No. 9, the curtain frame and curtain mechanism are installed.

At No. 10, the doors are put in place.

At No. 11, the final inspection is made and the machine is cleaned and polished.



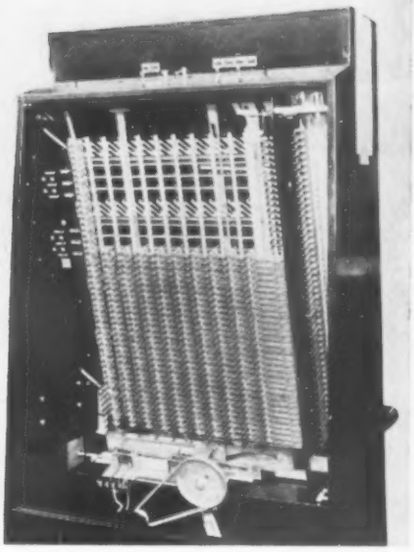


*Fig. 9 (left)—The machine at station 6 on the assembly line, showing the ballot face mounted in the unit. Fig. 10 (right)—Rear view of cabinet at station 7 on the assembly line, where the mechanism that controls the number of votes for each office is installed*

### How Machine Is Operated

A description of the work done by the machine affords a good explanation as to the requirements in the way of materials and parts. When the voter enters the voting machine booth to cast his vote, his first operation is to push the voting button. This starts the motor, which through a set of gears and main cam, closes the curtains affording the voter privacy. It also actuates the handle return frame through a latch release so that the voting handles can be turned, making it possible for the voter to mark his ballot. The motor also actuates another cam switch, by means of a sliding pinion, engages all the voting counters on the machine. Each counter is made up of four wheels. One of these wheels has marked on it a large X mark. The other three wheels are the units, tens and hundreds wheels respectively, making it possible for the machine to register up to 999 votes for each individual candidate.

After the voter has pushed the voting button, which performs the movements indicated above, he marks his ballot. He may vote a straight ticket by pulling down the straight ticket handle for the party of his choice. He may vote a split ticket by pulling down the individual handles by each candidate's name for whom he desires to vote. Each time he pulls the small lever by each candidate's name a large X mark will appear directly opposite that candidate's name.

After the voter has completed marking his ballot, he again pushes the voting button which records his vote by adding one to the total for each candidate for whom he has marked his ballot. The pinion operating the wheel with the X mark is disengaged, allowing the X to return to unvoted or normal position, with the X mark not showing. The handle return frame engages the voting spindles and returns the voting handles to normal position and locks them. The curtains automatically open the instant the voting button has been pressed. The voter is then enabled to leave the booth and the machine is set with a blank ballot ready for the next voter.

### Keys Lock Mechanism

Two keys to operate the locking system accompany the machine to the polling place. These keys, during the course of the election, are in the possession of the proper poll officials. At the close of the polls, the keys are inserted, a seal broken and a small lever on the top of the machine turned one-half revolution. The turning of this lever causes all of the voting counters on the face of the machine to be exposed directly under each candidate's name appearing on the face of the ballot, and also exposes the counters under the words "yes" and "no" in what is known as the "question" column. Thus it is possible, if desired, to photograph the face of the machine which gives instantly a permanent, accurately compiled, return sheet of the election. Once the returns have been exposed, it is impossible to operate the machine further. The two keys are automatically locked into the machine. In order to release them a third or master key is required. This key is in the hands of the board having entire charge of the election and does not go to the polling place with the machine.

It is estimated that the number of voters in the average voting precinct in the United States ranges between 400 and 500. The machines being capable of registering up to 999 votes, they are thus able amply to provide for the requirements of practically all existing precincts.

### Impounded After Election

After each election the machines are impounded under court order for a specified period of time exactly as they have left the polling place. After the impounding period, they are then returned to the proper election officials who then, by a simple device, can reset all the counters to zero in a few minutes in preparation for the next election.

The machine is equipped with a permanent counter, impossible of being reset, which adds up continually every time the machine has been operated from the time it leaves the factory. It also has what is known as a daily vote counter which is set to 000 prior to each election and shows during the course of the election how many electors have cast votes.

The machine has what is known as an officer's election latch at the lower right hand side. This latch must be operated by the officer in charge of the machine each time a voter enters and leaves the machine. Thus, it is impossible for a person to cast more than one vote.

# A.S.M. Grain Size Symposium Records Recent Progress

**STEEL herewith presents the first installment of its report on the important and well attended grain size symposium conducted by the American Society for Metals during its annual convention in New York, Oct. 1-5. Concluding installments will be presented in early issues.**

REFLECTING the present-day interest in grain size in metals, the grain size symposium conducted by the American Society for Metals on Friday, Oct. 5, attracted a record-breaking attendance. This symposium, started at a morning session and continued through the afternoon session, included the presentation of 12 papers on the subject and a considerable amount of pertinent discussion.

Held on the final day of the sixteenth annual National Metal congress, after the iron and steel and institute of metals divisions of the American Institute of Mining and Metallurgical Engineers, the American Welding society and the Wire association had concluded their meetings, the symposium attracted many members of these organizations. Each session opened with an attendance of 500.

IN introducing the subect of grain size with a paper "Grain Size in Metals with Special Reference to Grain Growth in Austenite," M. A. Grossmann, research engineer, Illinois Steel Co., Chicago, stated it seemed appropriate first to define the precise nature of the problem, and then if possible to add a few data to present knowledge. In this paper, the author discussed crystal structure in metals (see Fig. 1), relation between actual grain size and other properties, change of actual grain size, relation between austenite grain size and other properties, change of austenite grain size, variations in austenite grain size, effect of hot-working on coarsening temperature, and austenite grain growth and the McQuaid-Ehn test.

In summarizing his paper, Dr. Grossmann said it becomes possible now to assemble the known laws of austenite grain growth, and to point out their bearing on interpretations of the McQuaid-Ehn test. These laws apply more particularly to the lower carbon steels, perhaps under 0.50 per cent carbon.

1. Austenite may coarsen anywhere in the range of temperature from about 1500 to about 2100 degrees Fahr. If the McQuaid-Ehn test shows grain size in the range from No. 5 to No. 8, the steel probably still is at its initial austenite grain size at that temperature, 1700 degrees Fahr. If the test shows coarser grains—No. 1 to No. 4—the chances are that the steel has coarsened.

2. After carburizing in pack carburizer, the austenite grain size of the case may be finer than the austenite grain size of the core. This means almost invariably that the case is at its initial austenite grain size, while the core has coarsened.

3. The austenite grain size of the case may be coarser than the austenite grain size in the core. Such a circumstance means that the case has coarsened while the core is still at its initial austenite grain size.

4. Normalizing may make a finer McQuaid-Ehn grain size, particularly in alloy steels such as nickel, nickel-molybdenum and nickel-chromium steels. In this case, the normalizing has caused the ferrite grains in the steel before carburizing to be finer, and as a result the initial austenite grains are finer. The coarsening temperature has not been reached.

5. Cold work may lead to a finer McQuaid-Ehn grain size by the same mechanism in item 4, that is, by making finer ferrite grains.

6. Normalizing may on the other hand also lead to coarser McQuaid-Ehn grain size. Normalizing causes a lowering of the coarsening temperature, and if in any particular steel the normalizing has so lowered the coarsening temperature that the steel coarsens at 1700 degrees Fahr. while the unnormalized steel fails to coarsen, then the normalized steel will be coarser in the McQuaid-Ehn test than the unnormalized. The same comments apply to any heat treatment that lowers the coarsening temperature.

7. Hot work may make a somewhat finer McQuaid-Ehn grain size, depending partly on the finishing temperature. The mechanism is the same as in item 4, that is, it makes finer ferrite grain size, while the coarsening temperature has not been reached.

8. Hot work may lead to coarser McQuaid-Ehn grain size. Hot work frequently lowers the coarsening temperature, and if it lowers it to below 1700 degrees Fahr. while the original steel fails to coarsen at this temperature, then the hot worked steel will be coarser in the McQuaid-Ehn test than the original steel.

GENERAL relations between grain size and hardenability and the normality of steels were elaborated upon in a paper contributed by E. S. Davenport and E. C. Bain, research laboratory, United States Steel Corp., Kearny, N. J. This paper dealt with steels, which, although of similar composition, develop different characteristic austenite grain size at various heating temperatures alike for all. These individual grain growth tendencies correlate well with hardenability and certain mechanical properties, the coarser grained steels being, in general, deeper hardening and less tough.

From their investigation, the authors concluded that for any ordi-

*Fig. 1—Example used by M. A. Grossmann to show how grains deform in individual manners. Coarse grains were developed in this 18-8 chrome-nickel steel by heating for 24 hours at about 2400 degrees Fahr. A tensile test piece, top illustration, was cut from the block and etched to show individual grains. The bottom illustration shows the same piece after being elongated 27 per cent in 2 inches in a tensile machine*

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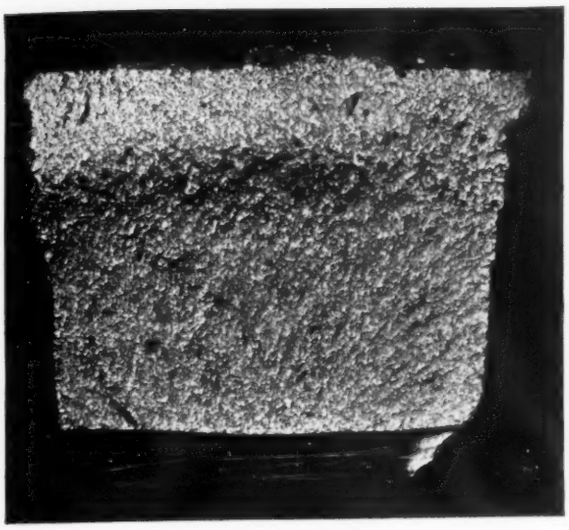
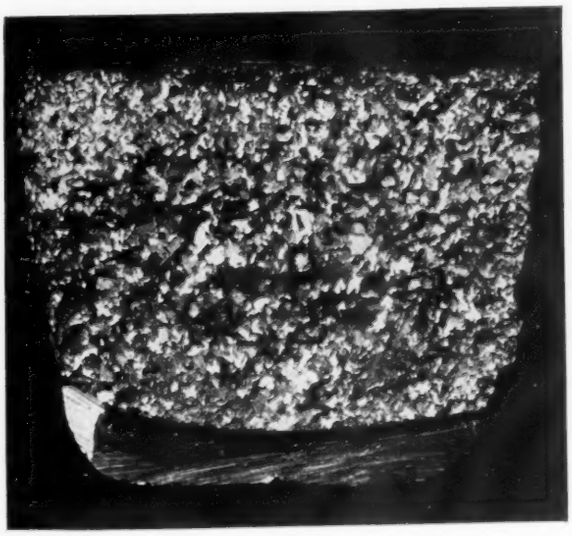
# HIGH NITROGEN FERROCHROME

## added in the Furnace

## GIVES GRAIN REFINEMENT



The fine grained structure of this fractured cast steel clearly indicates the effect of nitrogen. This cast steel contains 27.35 per cent chromium, 0.56 per cent carbon, 0.34 per cent nickel and 0.32 per cent nitrogen.



This coarse grained structure is that of a fractured cast steel containing only a trace of nitrogen. Analysis shows 27.85 per cent chromium, 0.50 per cent carbon, 0.75 per cent nickel and 0.06 per cent nitrogen.

★ Grain refinement of high chromium steels can be obtained by the addition of small percentages of nitrogen in the form of High Nitrogen Ferrochrome.

Castings for valves, pumps and fittings that are subjected to extremely corrosive conditions must combine corrosion resistance with strength and toughness. The use of steels containing over 20 per cent chromium gives the necessary corrosion resistance. Castings with high chromium content often have coarse grain structure and lack desired toughness. Nitrogen introduced with the chromium refines the grain and develops the inherent strength and toughness of the metal. The proper ratio of nitrogen to chromium is contained in a single Electromet alloy offered as High Nitrogen Ferrochrome which can be introduced into the castings by furnace additions.

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nary medium or high-carbon steel a correlation exists between the rate of transformation of the austenite to pearlite at any temperature and the grain size of the austenite. It is thought that the greater grain boundary area of the fine-grained austenite provides more nuclei, or transformation centers, than exist in the austenite of a coarser grain structure; the degree of undercooling, at any specific cooling rate is, therefore, less in the fine-grained austenite and the steel accordingly posseses a lower hardenability than if coarse.

Steels of the same composition may vary greatly with respect to the grain size of the austenite developed at any particular heating temperature. The interest usually centers in the grain size established at temperatures not more than 200 or 300 degrees above the $Ac_1$ temperature and at this temperature some steels have already coarsened while others remain fine. In general, a uniform grain size is quickly established as soon as most of the carbide has dissolved. If this first uniform grain size is large, it has little potential capacity to coarsen further; if fine, it is likely to undergo an exaggerated grain growth at some higher temperature.

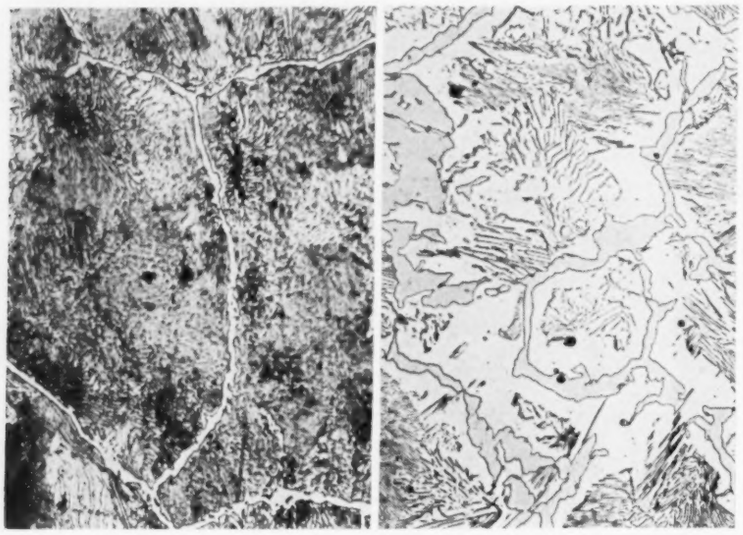

*Fig. 2—Photomicrographs used by E. S. Davenport and E. C. Bain to show typical normal and abnormal steels. A normal steel is shown at the left; an abnormal steel at the right. Magnification is 300 diameters*

### Cause of Shallow Hardening

The cause of the restraint of initial grain growth in some steels is believed to be the obstruction offered by dispersed particles of minute size—either nonmetallic or special carbide compounds. The more effective these particles are, the higher will be the temperature required for marked grain growth in the austenitic matrix. These particles, apart from their controlling effect upon the grain-growth characteristics of a steel are thought to act in another capacity. They appear to act also as nucleation centers for the transformation of the austenite upon cooling. Thus, not only the actual small grains, but also the underlying cause of the small grains may tend to produce shallow-hardening steels.

### Fine-Grained Steels Superior

According to Mr. Davenport and Mr. Bain, the transformation products of fine-grained austenite, either martensite and its tempered derivatives or even pearlite, are somewhat tougher than those derived from coarse grains of austenite. This circumstance is thought to relate to internal stress. Whatever the underlying cause, steels with inherently fine grain tendencies are vastly superior for many applications as a result of their greater toughness.

The fine-grained steels are necessarily more shallow-hardening, other factors being equal; hence some alloying elements are incorporated to restore deeper hardenability when required. An example of the use of higher manganese to compensate in this direction for the desired fine grain is shown to illustrate the manner in which controlled grain size operates.

Grain size in hypoeutectoid and hypereutectoid steels may be estimated microscopically in specimens prepared by cooling in such a manner as to produce first a pro-eutectoid net work and then cooling thereafter somewhat more rapidly to produce a dark etching matrix in the body of the parent grains. Eutectoid steels should be quenched just more slowly than the critical quenching rate, so as to mark out the grain boundaries wtih dark etching fine pearlite with martensite constituting the body of the parent grains. A special case of grain size estimation is that of case carburized steels in which the slowly cooled hypereutectoid zone is ideally constituted for the purpose. When applied to low carbon, low alloy carburizing steels certain characteristics of structure serve to classify the steels of high and low hardenability. To these extremes of structure the names "normal" and "abnormal" have been applied (see Fig. 2). The immediate cause of the abnormal structure is high carbon diffusivity relating to initial reaction rate. Normal steels are those having coarse grain size or carrying higher proportions of alloy or both. Abnormality is most pronounced in nearly pure iron-carbon steels having fine grain size.

In discussion, H. S. Rawdon, chief, metallurgical division, national bureau of standards, Washington, commented that the work of Davenport and Bain and others served admirably to clarify the situation that steels of the same composition can differ decidedly in their intrinsic properties, furthermore, their work shows that well-established metallurgical principles apply.

### Nomenclature Is Needed

Mr. Rawdon deplored the lack of suitable nomenclature for use in discussing grain size and pointed out that authors of papers find it necessary to define the terms to be used. Messrs. Davenport and Bain made it clear that the grain size phenomenon they were considering was not grain size in the sense that this term is generally accepted. He suggested that the American Society for Metals appoint a committee to co-operate with other technical societies in standardizing nomenclature.

"It would seem that a relatively simple precaution should go far in clarifying the situation," concluded Mr. Rawdon. "In brief, this is always to use the specific term 'austenite grain size' in speaking of the subject of quality in steel and not simply 'grain size.' Austenite is now a well-known term to metallurgists and no one need fear being dubbed a highbrow if he uses in specifying steel, the term 'controlled austenite grain size' instead of simply 'controlled grain size'."

GRAIN size in relation to machinability and other properties of bessemer screw steel was a subject of a paper presented by H. W. Graham, general metallurgist, Jones & Laughlin Steel Corp., Pittsburgh. It is recognized, stated the author, that grain size and quality have been studied to the greatest extent in the field of carburized parts and in the manufacture of heat treated articles made from forging steel. In both cases, grain size has been considered to have a relationship of some

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importance to the machinability of the steel. Since in bessemer screw steel, which is frequently carburized, one is dealing at first hand with the matter of machinability, it does not appear the subject discussed in the paper is unrelated with other work on the subject of grain size and quality.

### Machinability Is Investigated

Mr. Graham presented data obtained in a study of 14 lots of commercial cold-drawn bessemer screw steel. Chemical and physical properties were compared with the machinability of the various lots with grain

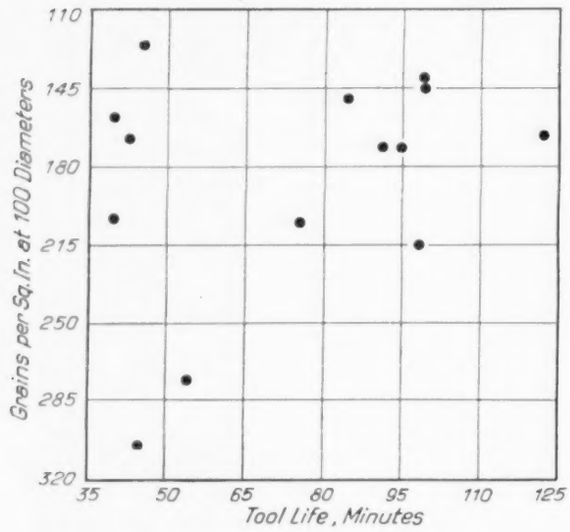


*FIG. 3—Grain size of commercial cold-drawn bessemer screw steel in the pearlitic or as received condition bears no clear relationship to machinability, according to H. W. Graham. Fourteen lots tested indicate improvement with increase in grain size. No attempt was made to correlate austenitic grain size with machinability, however, better machinability with larger austenitic grain size would be expected*

counts in the as-received condition and as shown by the McQuaid-Ehn test. No clear correlation between machinability and either chemical analysis or grain count was found by the methods used. Data were given on the work brittleness and work hardness characteristics together with some exploration of the effect of accelerated aging.

It must be admitted, concluded Mr. Graham, that the data presented do not make clear any definite relationship between grain size and machinability (see Fig. 3). From a practical point of view, it must be assumed that this is due to an insufficient number of test lots and to the fact that the various lots had not been reduced to a condition of proper comparability. However, it is not likely that any satisfactory demonstration of this relationship will ever be produced by the metallurgist. The answer must be presumed to lie in the field of physical metallurgy and it is to the physicist to whom we must look for help. Some information must be developed to show the relative energy expended in rupturing a grain boundary as compared to the energy required when the path of rupture passes through the grain itself.

Commenting upon Mr. Graham's paper, N. A. Ziegler, power use research department, West Penn Electric Co., Pittsburgh, stated that it has become certain that even very small variations, not exceeding a few thousandths of a per cent, in the amounts of impurities in iron alloys result in totally different magnetic properties. Since this is an established fact, it would be only logical to suppose that other properties of steels, such as machinability, hardenability, etc., are equally susceptible to such small variations which usually are beyond determination by ordinary analytical methods.

There still remains a great deal of work to be done to obtain a better control of properties in commercial alloys, continued Mr. Ziegler. The solution may be tackled from two directions: 1—A more refined laboratory technique, resulting in a wider knowledge and understanding of our commercial alloys; and 2—a better plant technique, so that the laboratory discoveries could be applied successfully to the manufacturing and treatments of alloys, thus resulting in a more accurate control of their properties.

### Other Factors Are Involved

Expressing disappointment that Mr. Graham did not find a more definite connection between some controllable factor and machinability, H. W. McQuaid, research metallurgist, Republic Steel Corp., Massillon, O., stated it was his belief, based on a rather large scale investigation, that the grain size of the steel as machined has a very definite bearing on tool life and finish. It is not, however, the only factor, and hence the effect of the "as is" grain size often is overlooked. Mr. McQuaid continued:

"In my opinion, the reason that a more definite effect of grain size was not developed was because no truly coarse grain samples were tested. In the class of steels tested, the grain size should be fairly coarse if the usual rolling temperatures are employed. Here, of course, we mean the grain size in the 'as rolled' condition and not the grain size as developed by the carburizing test. The advantages of coarsening the grain by employing as high rolling temperatures as possible consistent with safe operating practice, have been well established, particularly in the field of alloy steels.

### Rolling Plays A Part

"A connection between the McQuaid-Ehn grain size and machinability is naturally only indirect, since it shows the grain size after a prolonged heating at 1700 degrees Fahr. We are, however, interested in the grain size after the final rolling operation, and if this is well above the coarsening range of the steel in question, as it should be, we are not concerned with the McQuaid-Ehn grain size.

"It is true, of course, that the coarse grain type as shown by the McQuaid-Ehn grain size test can be finished at a lower rolling temperature with less adverse effect on machining than if it had been of the fine grain type as shown by the McQuaid-Ehn test. Since in this class of steels the coarsening range is approximately 1800 degrees Fahr. for the fine grain steel, the McQuaid-Ehn test becomes of little value providing the finishing temperatures are well above 1800 degrees Fahr. The higher the finishing temperature above 1800 degrees, the better the machining results should be, regardless of the grain size at 1700 degrees, as shown by the McQuaid-Ehn test."

A STUDY of grain size control of open-hearth carbon steels, conducted by S. Epstein, metallurgist, Battelle Memorial institute, Columbus, and J. H. Nead, chief metallurgist, and T. S. Washburn, metallurgist, respectively, Inland Steel Co., Indiana Harbor, Ind., showed that this control can be assured by use of moderate ladle additions of aluminum and by controlling the manganese and silicon content of the steel.

The summary of this investigation is as follows:

1. A study of grain size control of open-hearth steel showed that given ordinary good furnace practice positive production of coarse or fine-grained carbon steel at will can be attained by a controlled ladle addition of aluminum and a controlled reactive oxygen content, which in turn depends largely on the carbon, manganese and silicon content of the steel. For a range of carbon steel between 0.15 and 0.50 per cent, and for a manganese content of 0.50 per cent and above, and silicon content of about 0.15 per cent and above, a fine-grained type of steel was invari-

ably obtained, with the furnace practice used, by means of an aluminum addition in the ladle of about 1 pound per ton. With the furnace practice employed, a coarse grained steel is obtained by omitting the aluminum, or else using considerably less aluminum; in general, an addition of less than about ½ pound per ton of aluminum in the ladle to a steel of less than about 0.10 per cent silicon content results in a coarse grained type of steel.

2. Production of intermediate grain size to schedule in a nominally plain carbon steel, with standard basic open-hearth melting practice, requires reduction of reactive oxygen below the amount that is utilized in making the fine-grained steel. This requires a higher content of manganese and, or, silicon and is really equivalent to making a low-alloy steel.

3. Microscopic inclusion counts and oxide analyses indicate that the moderate amounts of aluminum required to give a fine-grained type of steel did not increase the number of larger inclusions, or adversely affect the cleanliness of the steel. This was true when the aluminum was added either in the ladle or mold. This would indicate that satisfactory grain size control by means of aluminum can be accomplished without detriment to the quality of the steel. However, further experiments are being conducted on the use of titanium or zircomium in conjunction with aluminum, and possibly some such combination may be more satisfactory than aluminum for some purposes.

### Price Extras Justified

4. The amount of aluminum and silicon required to give fine grain results in a fully killed deeply piping steel. Such steel for best resuts must be poured in hot-topped molds and should bear some price extra for this type of practice.

5. Tests of mechanical properties of the coarse and fine-grained steels obtained indicated that after a heating which produced a difference in grain size between the coarse and fine-grained steels, followed by air-cooling, the fine-grained steels had a higher yield strength, slightly higher ductility, and higher impact resistance than the coarse-grained steels, and had about equal tensile strength.

6. The hardenability of the fine-grained steels was distinctly lower than that of the coarse grained steels. After carburizing, however, uniform hardening of the fine-grained steels could be obtained by quenching in brine.

According to the authors, neither type of steel has the advantage over the other for all uses; for some purposes coarse grained would seem to be better and fine grained for others. Positive grain size control in the open-hearth furnace enables the production of either type of steel at will, thus affording the steel user a dependable and uniform supply of whichever type he prefers, uniformity of the supply being especially important in mass production.

W. H. Woodhall, metallurgist, Harrison Steel Castings Co., Attica, Ind., commented upon this paper, stating that several years ago his company added aluminum to all its heats. The company makes plain carbon steel by the acid open-hearth process and it was found that aluminum helped little in obtaining steel of good quality. Most of the castings produced must be heat treated. These castings are of S. A. E. 1045 steel and such erratic results in hardness were obtained after a water quench that the use of aluminum was discontinued. In fact, customers using this grade of steel object strongly to the practice of adding aluminum. In conclusion, Mr. Woodhall stated that his company believes good quality steel can be made without aluminum additions, especially where the steel must be heat treated afterward.

### Disputes Steel Cleanliness

Adding to the discussion, G. F. Comstock, Titanium Alloy Mfg. Co., Niagara Falls, N. Y., took exception to the statement of Messrs. Epstein, Nead and Washburn that aluminum additions in the mold did not adversely affect the cleanness of the steel. A careful study of the microscopic inclusion counts, he said, failed to justify this conclusion. After discussing this matter in considerable detail, Mr. Comstock said:

"In regard to deoxidizers other than aluminum, the statement about tiny oxide particles from titanium is at variance with general experience, and some evidence in support of such a statement would seem to be required. It is a well-known fact that titanium oxide is used as a flux in ceramic practice, while alumina and zirconia are not fluxes but serve as very efficient refractories. The writer has never seen any characteristic titanium oxide inclusions in low or medium-carbon steel, nor any illustration or description of oxide inclusions due to titanium in such steels, and if the authors have discovered them a description would be of interest, and the method of use of the titanium for forming them should be stated.

"Alumina inclusions are on the other hand well known, and steel treated with aluminum can almost always be identified by their presence. The statement that titanium gives rise to oxide particles like alumina is contrary to past experience; in fact, titanium in the form of ferro carbon-titanium has been and is now being used to replace a major portion of the aluminum for grain-size control for the express purpose of securing a more uniform product with fewer inclusions of alumina and other oxides of slag. The further tests made by the authors along this line should show some interesting results."

*(To be continued)*

## Develops New Method for Testing Molding Sand

Knowledge of the constituent particles of a molding sand is decidedly important in making satisfactory castings, says the national bureau of standards, Washington.

Recent work in the experimental foundry of the standards bureau has shown that a modification of the sedimentation method can be applied readily. By means of a transfer pipette, a sample is taken of a water suspension of the molding sand which has been allowed to settle for a definite period of time which depends upon the size separation desired. The weight of this sample after being evaporated to dryness, affords a basis for calculating, on a percentage basis, the size distribution of that portion of the original material which is too fine to be classified by sieve analysis.

It has been determined by studies at the standards bureau that the method can be simplified somewhat for use as a rapid method suitable for clay substance determinations in foundry control work and testing.

## Less Smoke in Cities To Increase Use of Steel

Current and prospective improvement in the outdoor air supply of many cities is clearing the way for the wider use of metals in the construction of residential properties, in the opinion of H. B. Meller and L. B. Sisson, who are conducting the air pollution investigation of Mellon Institute of Industrial Research, Pittsburgh.

They see in the offing the mass production of a satisfactory home-size automatic stoker at a price much lower than any yet announced.

Steel manufacturing centers, and most large metal fabricating points, have a vital interest in the immediate prospects for larger use of metal in the building of dwelling houses, as well as larger structures. Corrosion-resisting steels, alloys, enamels, and protective coatings are now readily available at practical figures. These materials will give greatest satisfaction in cities where smoke is under control. While smoke stack output expectedly will continue to include acids, the smaller tarry content of smoke will markedly lessen the opportunity for the acidic compounds to effect damage. Science has made rust less of a bogey for householders. Protection of metal surfaces and their maintenance in an attrac-

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tively clean degree can be easy and inexpensive in communities where the best fuel combustion practices are the rule.

The metal manufacturing world appears not yet to be fully awakened to the magnitude of the market being opened to it by the progress in modern types of housing.

Steel centers may soon be vieing with each other in producing metal houses in the $2500 class and upward where metals will be extensively employed both for strength members and enclosure purposes. Air conditioning is becoming standardized and within the reach of the middle class of dwellings. The rapid expansion of this industry would call for considerably more metal.

# Alloy Cast Iron, Used for Hydraulic Rams, Shows Uniform Texture

CHANGED practice for producing cast hydraulic rams recently was effected by the Barnett Foundry & Machine Co., Irvington, N. J. These rams are now of iron with the following analysis:

| | Per cent |
|---|---|
| Total carbon | 2.96 |
| Combined carbon | 0.74 |
| Manganese | 0.91 |
| Silicon | 1.46 |
| Sulphur | 0.102 |
| Phosphorus | 0.128 |
| Molybdenum | 0.58 |
| Nickel | 0.61 |
| Chromium | 0.23 |

This iron is produced by normal cupola operating methods. The charge contains 60 per cent steel scrap, with scrap iron, pig iron and alloys constituting the remainder.

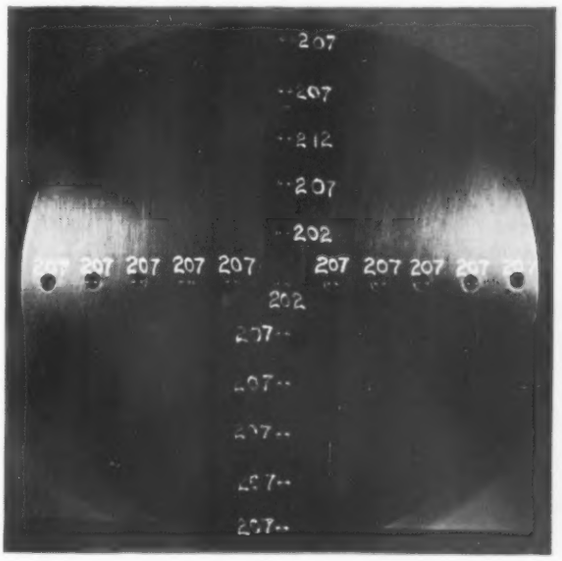
The accompanying photomicrographs show the grain structure at the center and outside edges of a polished etched section cut from one of these cast rams 6½ inches in diameter, at about 100 and 500 diameters magnification. An accompanying illustration also shows the brinell readings obtained at ½-inch intervals across the face. All these readings were 207 excepting two of 202 and one of 212.

The rams cast from the metal described above are not only uniformly fine grained but are easily machinable, solid and tough. The Barnett company regards this same mixture as being applicable to the casting of lathe beds, large machinery frames, heavy cylinder liners and pressure pump liners.

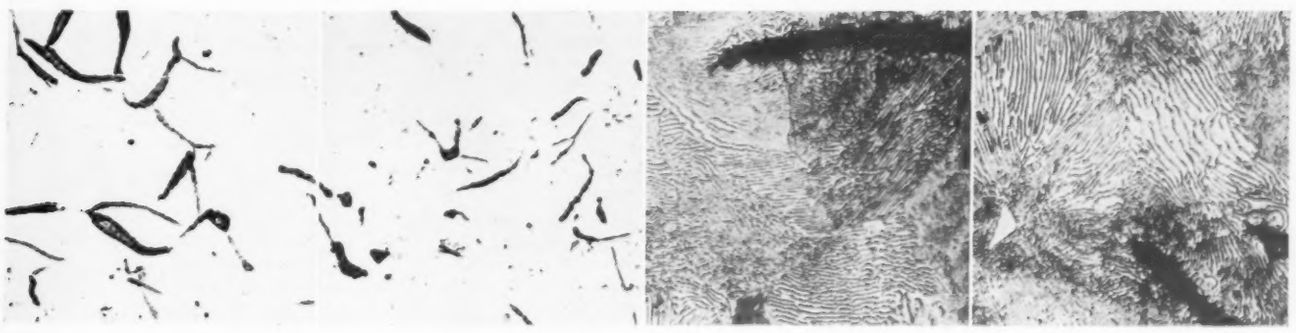
## Spiral Castings Indicate Running Quality

A reliable indication of the casting or "running" quality of a metal —can be obtained by casting, under carefully controlled conditions, a spiral strip having a cross section which is small relative to its length. As a result of many experiments in the metallurgy division of the National bureau of standards, Washington, it has been demonstrated that the length of the spiral is a numerical measure of the running quality of the metal under the given set of conditions.

Recently the running quality of two grades of aluminum, pure and commercial, and of an alloy of 8 per cent copper with commercial aluminum was studied under a number of conditions by making these small spiral castings. It was found that in the temperature range from 1220 to 1475 degrees Fahr. a linear relation exists between the length of the spiral and the temperature at which the casting is poured, and that for a given pouring temperature, shorter spirals are obtained when the metal had previously been superheated to 1560 degrees Fahr. than when it had been superheated to 1380 degrees. This probably is due to the formation of greater quantities of aluminum oxide at the higher temperature, which interfere with the running of the metal. In addition to a number of minor effects, it was found that aluminum of 99.8 per cent purity produced spirals about 1½ times as long as commercial aluminum 99.2 per cent pure.




*CROSS section through hydraulic ram casting, with brinell numbers stamped opposite impressions. Note uniformity of readings throughout the 6⅛-inch diameter section*



*Photomicrographs of casting sections: From left to right, unetched section taken from edge of casting, X100; unetched section taken from center of casting, X100; etched sectionfrom edge, X500; and etched section from c enter, X500*

## Preparing Surfaces For Metal Coating

IN PREPARING steel, wood and other materials, to take a sprayed molten metal coat, it is essential to provide the material with a surface which will be gripped securely by the sprayed coating. This kind of surface is best obtained on metals by sandblasting. One authority recommends angular steel grit as the best material for such sandblasting, inasmuch as it can be used over and over again and is the most economical material in the end.

Sprayed molton metal coatings on the average are 0.006-inch thick or about twice as thick as the usual galvanized zinc coating. It is stated that the porosity of the sprayed coating depends on the manner in which the operator handles the spray gun.

Sprayed coatings may be applied economically to a maximum thickness of about 1/32-inch. For ordinary purposes, coatings above 1/32-inch prove too expensive to be commercially useful. For this reason not much effort is made to interest a great many possible consumers in the utilization of sprayed coats for certain purposes. For instance, wood patterns could be covered with metal coats, but it is felt that the thickness of coat required to resist punctures in ordinary usage might be too high in the majority of cases for extensive use.

Sprayed metallic coatings now are extensively used for a variety of purposes; elevator panels, for instance, are extensively decorated with molten metal sprayed through stencils. Defective spots, such as blow holes, in castings are built up with sprayed metal. The interiors of tanks and boilers frequently are sprayed with lead or zinc to guard against corrosion.

Mass spraying is done in tumbling barrels on many small products such as nails, bolts and nuts. Spraying also is used extensively for bringing worn surfaces, on shafts, rolls, etc., up to dimensions.

\$ \$ \$

## Hacksaw Cutting of Steel Achieves New Records

Cutting steel by means of steel hacksaws is being reduced at some shops to the status of an art. Two interesting instances of highly accurate hacksaw cutting were developed recently. A piece of die block steel of S.A.E. 3140 analysis, 5½ x 4¼ inches, was cut in 6 minutes, with variations in the thickness of the cut remaining within 0.001-inch. The cut was made with a 14 x 1¼-inch blade made of 0.065-gage steel.

In another case a 7½ x 8-inch piece of die block steel of the same analysis was cut in 12 minutes with a thickness variation of only 0.0025-inch. The saw in this case was 17 x 1¼ inches and made of 0.065-gage steel.

\$ \$ \$

## Abrasive Method Produces Distinctive Finishes

By using a piece of fine emery cloth draped over the end of a wood cylinder, with a wire wrapped around it to form a retaining band, and fitting the other end of the cylinder with a shank to be held in the chuck of a drill press or similar machine, a very distinctive finish can be imparted to a surface, somewhat resembling overlapping fish scales, says John E. Hyler, in *Abrasive Industry* for October, 1934. The cylindrical tool with abrasive end is simply brought down upon the surface firmly enough so the abrasive will cut enough to catch the light and show in the form of a circle. The size of the circles will be the size of the end of the cylinder, of course, and therefore the cylinder may be

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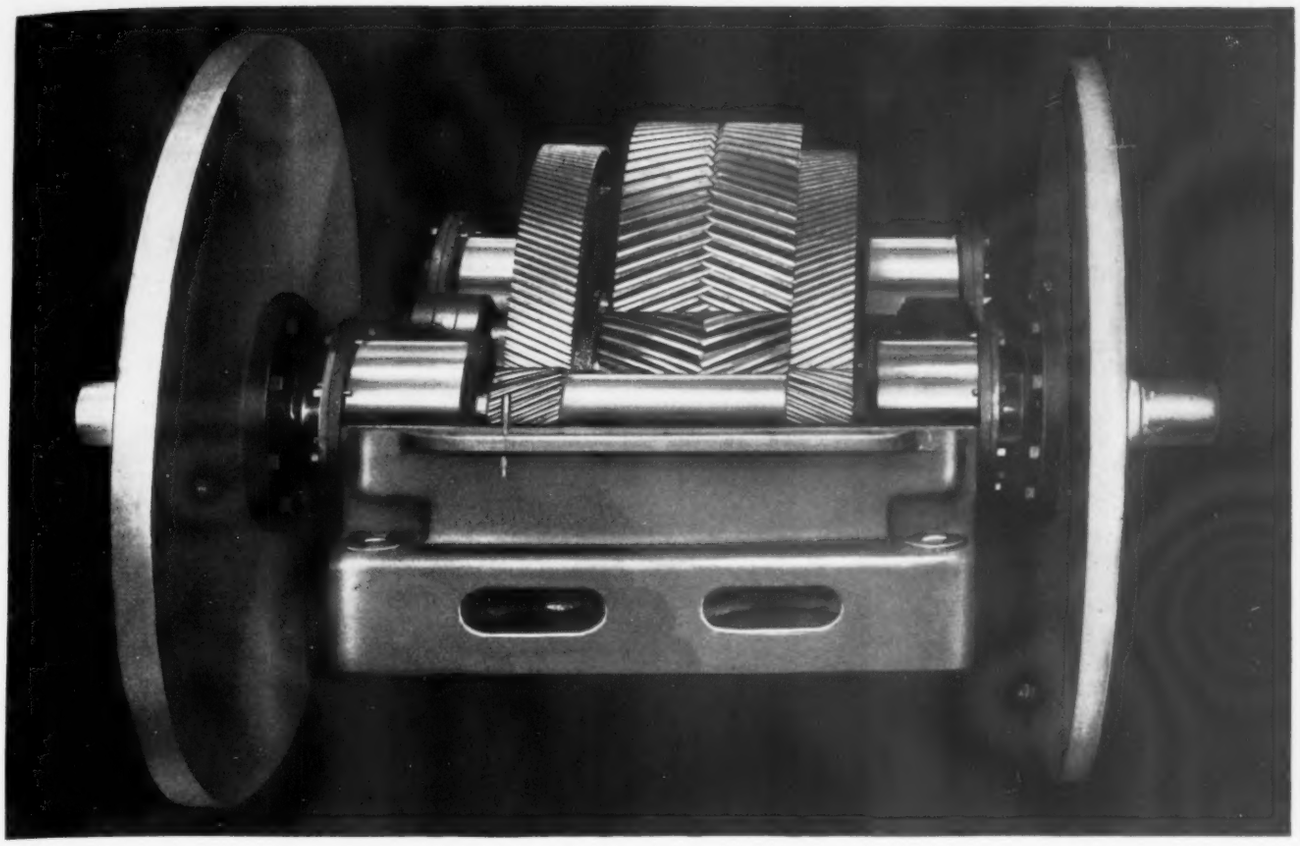

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turned to suit in each case. The circles are placed closely enough together to overlap.

Where it is desired to obtain a fish scale effect, with the circles overlapping from one side only, it will be necessary to tilt the table of the machine just slightly, or if the table does not tilt, arrange a false table at a slight departure from 90 degrees with the spindle. In this manner, the circle will not be complete at light pressure, and with a moderate amount of practice, splendid results can be obtained. All cuts are made very light—it is the light striking the surface that has been worked that makes the finish show up, rather than any metal which has been removed.

S S S

## Periodic Tests Adopted To Improve Welding Skill

In a Detroit welding shop a special incentive has been established to encourage welders to do sustained good work. It conducts periodic tests of the qualifications of welders and has a special class for those welders whose test pieces and whose performance on regular production work entitle them to recognition as the best welders in the shop.

Four welders now are in this special class and they are paid high differentials over the compensation to regular welders. The welders in this special class are under the necessity of giving continued proofs of their skill in order to retain their position in this class, while the rank and file welders in the plant are constantly striving to get into the special class. As a result of this policy, the company finds that it is developing a much higher degree of welding skill in its plant than existed previously.

S S S

## RecuperativeAnnealingUnits

In general, well designed recuperative electric annealing furnaces require only 50 to 60 per cent of the amount of heat, or power input, required by the ordinary non-recuperative furnace, and therefore this type of equipment makes it frequently possible to employ electric heat with many advantages for the annealing of relatively low-priced materials.

S S S

## Sprays Cadmium on Parts

In many cases where size of a work piece prevents cadmium plating, builders of heavy apparatus are using the molten metal spray gun method of applying cadmium as well as other metals.

A manufacturer of marine apparatus is applying cadmium in coatings up to 1/32-inch thick in this way to afford protection against salt water. This manufacturer prepares the steel to be coated by subjecting it to a sandblasting operation which affords a clean, rough surface to which the sprayed metal will be tightly keyed.

S S S

To paint badly rusted acetylene generators, one authority advises that all scale be removed after which a good grade of black asphaltum paint be applied evenly on the inside and allowed to stand 24 hours before using the generator. Care must be taken not to use open lights in or near a generator when applying asphaltum paint for the reason that gasoline often is used to thin the asphaltum.

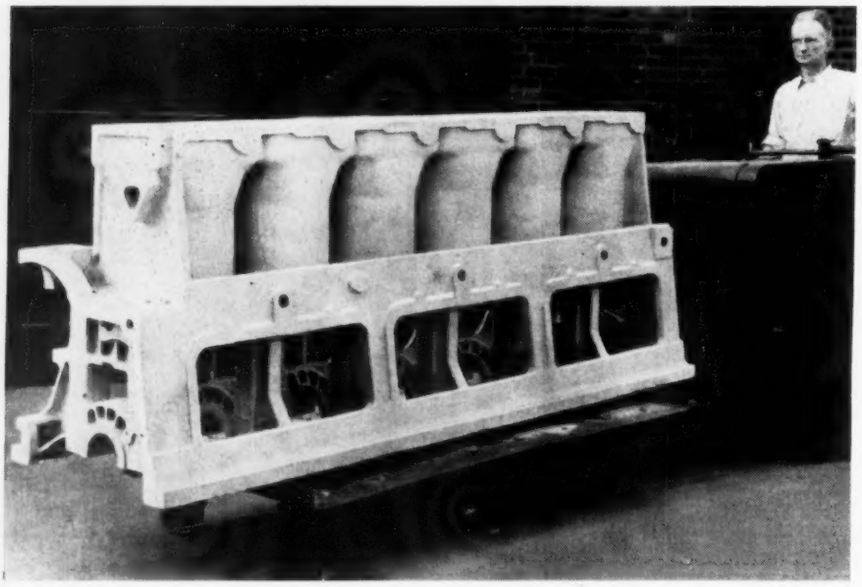
# Flame Machining More Widely Used for Planing, Milling, Turning, Drilling

FLAME machining, a development of the past two years, has achieved remarkable results and gives promise of providing more notable developments in the future, according to the September, 1934, issue of *Oxy-Acetylene Tips*. The fundamental principle of this process is that of the chemical reaction between iron and oxygen; but the purpose is not severing metal, but the removal of a predetermined depth and width of metal by impinging the cutting oxygen jet on the surface at an acute angle.

The scope of flame machining, while not yet as fully developed as flame cutting, is rapidly becoming equally as broad and just as valuable as a formative tool for the preparation and shaping of steels. Its application may be classed under five heads: Planing, milling, turning, drilling and boring.

Under the first of these the operations of deseaming, hogging and surface planing have had considerable commercial adaption. Flame milling includes the important use of the flame for longitudinal fillet cutting for the preparation of special edge contours, and the sinking of regular planing cuts. By flame turning, screw threads and various special milling cuts can be produced with proper adjustment of the cutting oxygen stream. Flame drilling and flame boring are two applications that have as yet had but little attention, but may reasonably be expected to come into greater prominence in the future.

In fact, the whole field of oxy-acetylene cutting is changing over its entire front. The possibilities of further development are a long way from being exhausted, and the ultimate effect on industry of changes



*HUGE ALUMINUM CASTING FOR DIESEL ENGINE: Claimed to be one of the largest aluminum castings ever produced, this unit, comprising engine frame and water jacketing, is for a large four-cycle diesel engine, and weighs but* 1640 *pounds, as against* 3000 *pounds for a similar iron casting. It was supplied to the Ingersoll-Rand Co. by the Bohn Aluminum & Brass Corp., Detroit, and is of a special heat treated alloy designed particularly for high-pressure service*

that undoubtedly will be wrought in present procedures within a short time cannot even be predicted. Precision flame cutting of steel within tolerances comparable to those of machine tool cuts, but with an economy and flexibility previously impossible, and the feasibility by this method of cutting in different planes or at different levels and angles on the same work, all point to a gradual replacing of complicated tool machinery by oxyacetylene cutting equipment.

Thus far, practically 90 per cent of all the cutting done commercially has been in thicknesses less than 2 inches. Heavier work, however, is increasing right along, as the economical preparation of the heavy gages by flame cutting has greatly encouraged their use in fields heretofore closed. This permitting the use of assemblies made from flame cut hot-rolled steel. A large field for replacement of obsolete material is thus being opened up.

# New Design Trends To Be on Display

OF UNUSUAL significance to many metalworking companies and fabricators, the coming display of contemporary American industrial art, to be conducted by the Metropolitan museum of art, New York, Nov. 5, 1934, to Jan. 6, 1935, is expected to reflect design tendencies which will influence the manufacture of all sorts of metal goods over the near future. This will be the thirteenth in the series of industrial art exhibitions. It will mark the progress of design over a 5-year period, particularly in the field of home furnishings.

Present indications are that several new trends will be illustrated at this display. It is expected that a great deal of steel furniture will be shown. It also is expected that new types of surface treatment will be displayed in such steel furniture. Advance information, for instance, is to the effect that much steel furniture now having chromium-plated and nickel-plated tubular stock as its basis will be finished in black. This tendency already has been shown in department stores and elsewhere in such steel products as electrical water coolers, air-cooling and conditioning units. Porcelain-enameled steel is expected to show up in an impressive way in this display. The show, in general, is expected to be of interest to designing engineers, architects, naval architects, designers of railroad equipment, interior decorators and sales promotion managers.

The following, reprinted with permission from the bulletin of the Metropolitan museum of art, sets forth the arrangements for the exhibition:

"This year the Museum has again enlisted the aid of a co-operating committee, though its organization has taken quite a different form from that of 1929. According to the scheme of installation, the gallery of special exhibition will give the impression of three related galleries. The Museum has invited three architects, Paul Philippe Cret, Arthur Loomis Harmon, and Ely Jacques Kahn, to supervise the design of these major units. Each will undertake to harmonize and present as a general gallery project the work of several other co-operating designers.

### Details of Major Units

"Mr. Harmon's unit, the central section of the gallery, will consist of six complete interiors, each designed by an architect who will in turn marshal such other individuals and firms as may be necessary to realize his own part of the exhibition. The architects who have kindly agreed to assist in this unit are Archibald M. Brown, William E. Lescaze, John W. Root, Eliel Saarinen, Eugene Schoen, and Ralph T. Walker.

"Similarly Mr. Cret and Mr. Kahn will be assisted by groups of designers. In their units the presentation will not permit the installation of complete rooms; instead arrangements of parts of rooms and groupings of objects of industrial art, such as textiles, furniture, glass and pottery are planned. Mr. Cret's collaborators to date include Gustav Jensen, Gilbert Rohde, Lee Simonson—who will have the collaboration of Raymond Loewy—Walter D. Teague, and V. F. von Lossberg; while Mr. Kahn will be assisted by Donald Deskey, Walter W. Kantack, Irvin L. Scott, and Walter von Nessen.

"All these designers will be asked to recommend such other designers and makers of individual objects as may be necessary for the carrying out of their respective projects, though, as is always the case, entries will be shown only by direct invitation from the Museum.

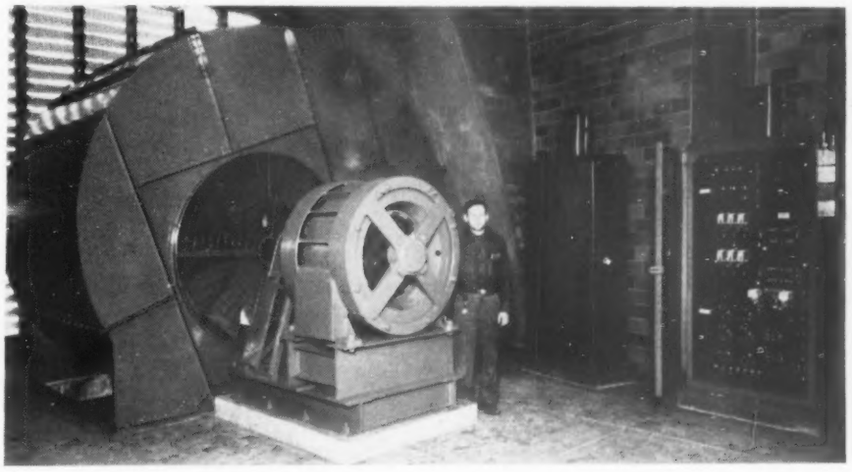
"The exceptionally large attendance at the last exhibition of this type, over 186,000, may be regarded as an endorsement of this kind of display which encourages a hope that this year's effort may be similarly rewarded."

# New Method Determines Tin Coating Thickness on Steel

A new rapid method of determining the thickness of a tin coating on steel is described in a paper by Dr. S. G. Clarke published in a recent issue of *The Analyst*. The procedure outlined is said to be a simple one.

The tin is dissolved from a known area by a cold solution of hydrochloric acid and antimony chloride, and its amount is determined by the loss of weight of the specimen. The base metal is unattacked, but a small correction has to be applied to allow for the layer of tin-iron alloy. In addition to speed, the method has the advantage that the thickness of tin on a given portion of the surface can be determined by protecting the remainder with a coating of cellulose varnish.

A reprint of the paper, designated as Technical Publication, Series A, No. 12, has been issued by the International Tin Research and Development council. Copies may be obtained by addressing L. J. Tavener, United States representative of the council, 149 Broadway, New York.



*ONE OF 28 VENTILATING FANS FOR VEHICULAR TUNNEL: One million cubic feet of fresh air per minute and a complete change of the roadway air 40 times per hour must be produced by the ventilating system in the East Boston traffic tunnel, said to be the largest vehicular tube in the world. To provide this volume of air, 28 motor-driven fans are in constant operation. Motors are two-speed squirrel-cage type, built by the Lincoln Electric Co., Cleveland. They have synchronous speeds of 450 and 225 revolutions per minute, with horsepower ratings at these speeds of 50 and 6.25 respectively*

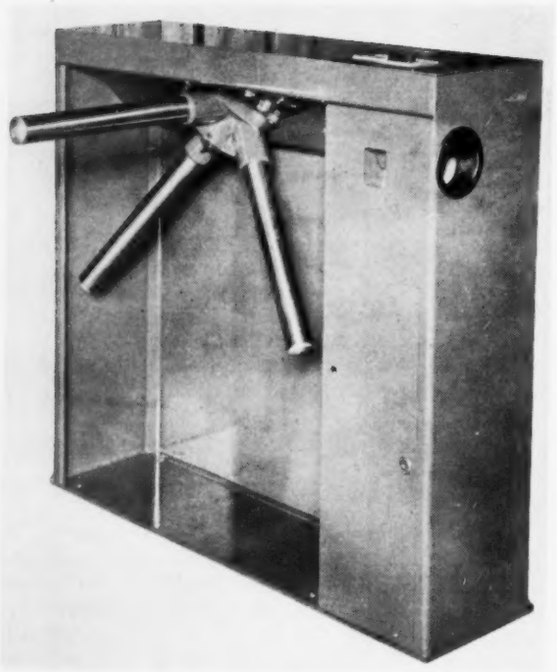


*FIG. 1—This compact type of coin-operated turnstile has arms of stainless steel and weighs about 350 pounds. Hub is of cast iron; cabinet of sheet steel*

—Illustrations courtesy Perey Mfg. Co. Inc., New York

# LARGE USES OF STEEL IN SMALL WAYS

272nd Article ◆ Turnstiles

A FAIRLY sizable tonnage of steel is consumed annually in the production of turnstiles. Flat-rolled products, such as plates and sheets, are the principal items required, although bars, tubing and castings represent a good proportion. Stainless steel is coming in for increasing application for certain parts.

From year to year the total tonnage varies considerably, depending upon the number of large projects for which turnstiles are required, particularly in the transportation field, such as subways, passenger terminals and the like. A subway system in New York, for instance, requires hundreds of turnstiles of various descriptions. Even a section of such a system requires many.

However, as turnstiles find application in a variety of enterprises—amusement parks, restaurants, race tracks, ball parks, department stores, industrial plants and others—there is usually sufficient demand to keep the dips from proving excessive.

Various types of these units require various amounts of steel, as indicated by the line of one leading manufacturer. One type, shown in Fig. 2, a high so-called prepayment entrance turnstile is virtually all steel and weighs approximately 1350 pounds. Of the total weight, 500 pounds go to make up the coin mechanism compartment, of chiefly ¼-inch and ½-inch steel plate; and 400 pounds, the revolving drum, which is constructed of 20-gage copper-bearing sheet steel, small angles, square and round bars and 3-inch extra heavy steel pipe. The top plate, which is 3/16-inch thick and 6 feet in diameter, accounts for another 250 pounds and the side sections, of bars and 20-gage plain hot-rolled sheets, 150 to 200 pounds.

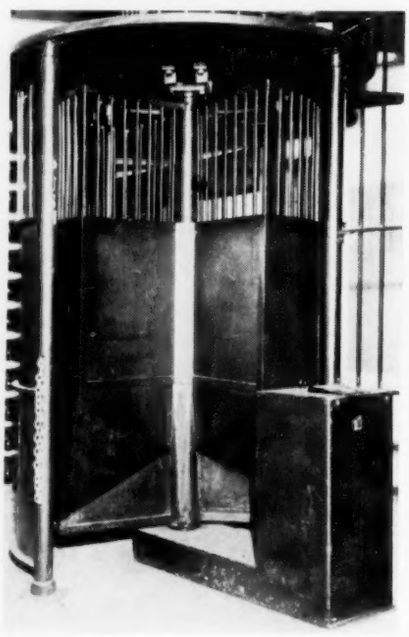


*Fig. 2—High-type prepayment entrance turnstile, weighing about 1350 pounds, and used extensively on the Eighth avenue subway system, in New York*

There are 100 of these turnstiles on the Eighth avenue subway system in New York alone, and since this model was developed a year and a half or so ago, fully 200 have been installed throughout the country.

This type of entrance turnstile is designed to make it impossible for a person to enter except by depositing the required fare in the coin slot, and functions without the supervision of an attendant.

### Batteries of Smaller Models

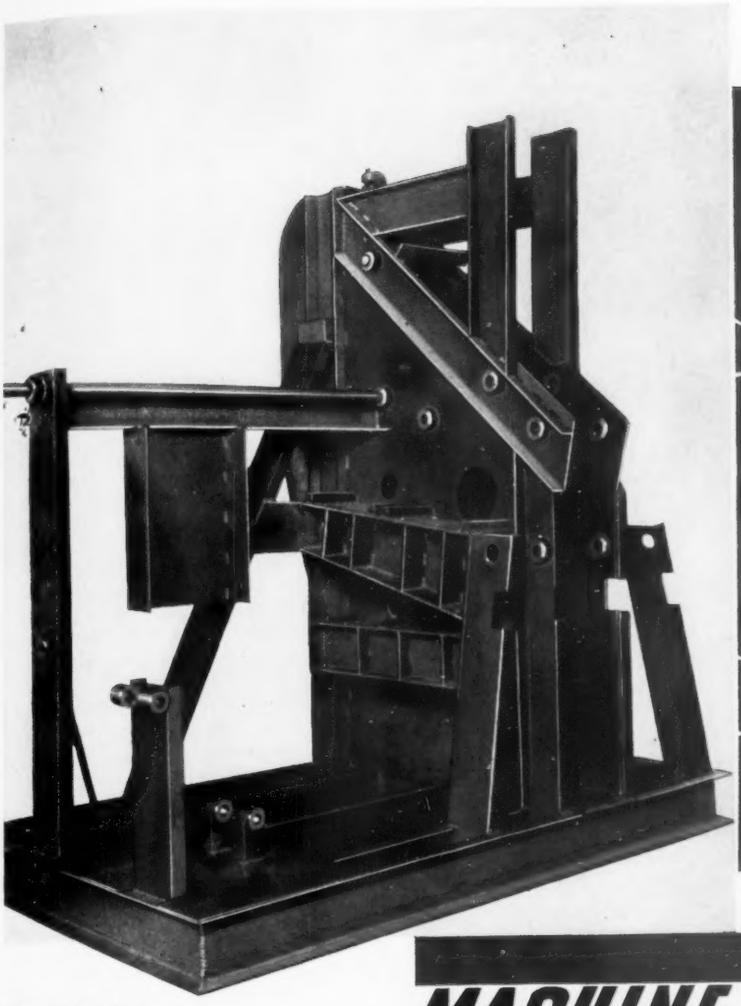
The more usual type of coin motivated turnstile is about 38 inches high and is usually installed in batteries at points where one or more attendants are stationed. This weighs approximately 500 pounds, all iron and steel, except for four hollow wooden arms which weigh about 3 pounds each. The major steel item is plates, 3/16, ¼ and ⅜-inch, with some 12-gage hot-rolled sheet steel also required. In addition, there are cold-rolled steel bars, used principally in the coin mechanism, cast iron for the hub and malleable iron for the ratchet.

A more compact model is a recent development, weighing 350 pounds, all iron and steel, except for a little bronze for the coin slot, and one or two other small parts. Five units of this model, shown in Fig. 1, can be installed in the space required for three of the above mentioned type.

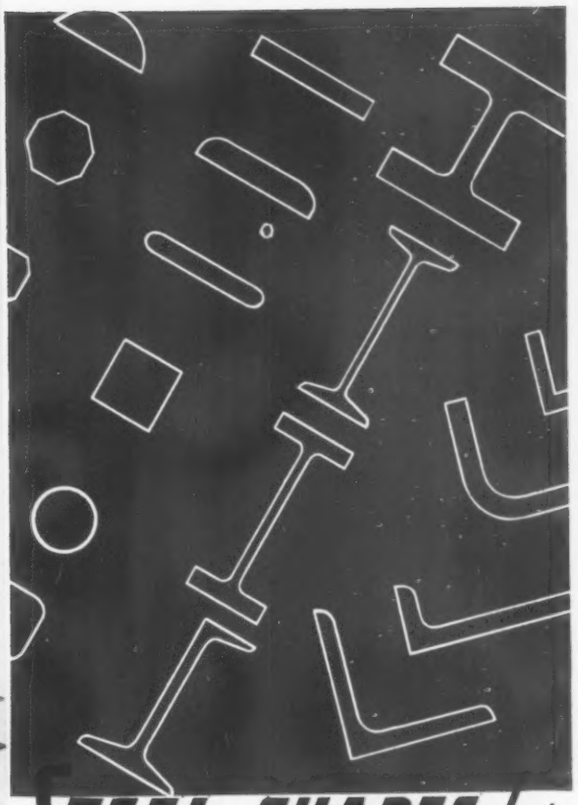
Arms of the new design operate on a different principle. In the first place there are three instead of four arms, and they are of stainless steel instead of wood. They are set rigidly in the form of a truncated cone, revolving at such an angle that, when the turnstile is in a locked position, one arm always extends horizontally across the entrance passageway, while the other two swing downward, out of the way. This naturally requires less space.

The three arms require a total of about four and a half feet of 2-inch tubing, 16-gage metal, weighing about 6 pounds. The hub is of cast iron and the cabinet is of ⅛, 3/16, and ⅜-inch plate, the thinnest plate being for the top.

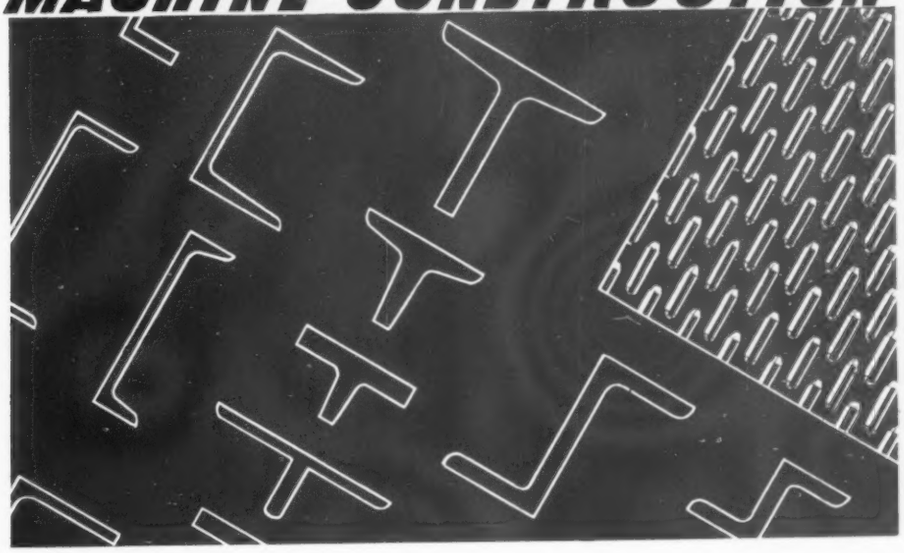
A compact and light type of turnstile is required for buses, street cars and for portable use. This type usually is constructed principally of cast aluminum, the frame being of this material. However, the arms and the hand rail over the top are of stainless steel, and a thin sheet of



Arc welded frame of coke pusher. Photo courtesy of Lincoln Electric Co.



# STEEL SHAPES for MACHINE CONSTRUCTION



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hot-rolled steel often is used as a side guard. Incidentally, the weight of this turnstile is around 160 pounds.

Another type of turnstile is equipped with a pedal by which it either may be locked or unlocked. Possibly the latest models of this type are those to be found in the observation tower of the Empire State building in New York. Each unit has four arms of aluminum, all cast in one block, with the base of cast iron. Each weighs 200 pounds, of which about 175 pounds is ferrous metal.

Still another type is a high revolving gate suitable for exits. Each one of these units weighs about 700 pounds, of which 350 pounds is 1-inch galvanized wrought steel pipe and the remaining 350 pounds, various small galvanized angles, flats, malleable iron clamps and cadmium plated bolts.

# Tests Made on 2800-Foot Length of Welded Rail

WELDING as an increasing factor in the maintenance of railroad tracks and in the joining of rails ends into lengths of 2800 feet or more were subjects of discussion in papers presented at the meeting of the American Welding society at New York Oct. 1-5. Experiments with welded rail joints for main track, notably by the Delaware & Hudson railroad, are now underway, including a double track 2000 feet in length, at Mechanicsville, N. Y., the rail ends being partially machined before shipment from the mill to facilitate joint welding. Practically every type of welding is utilized in track maintenance and joint connections.

### Expansion Overestimated

Pointing to the fact welding has been extensively employed by the electric railroads, H. S. Clarke, engineer, maintenance of way, Delaware & Hudson, said the problem for the steam roads differed greatly. Electric railroad tracks are frequently buried in the pavement, held rigidly in place, preventing expansion, contraction and buckling of the rail. In the steam road tracks it has generally been believed enough space must be left between rail ends to allow for these factors under various temperatures, especially for expansion at the higher temperatures. Actual experiments and observation, however, indicate this factor has been overestimated. In Germany and Australia it has been found that the theoretical expansion in long rails at the ends does not take place to the degree generally supposed, the same holding for contraction at lower temperatures.

Experience with long welded rails on the Delaware & Hudson indicates that ends of long stretches have little, if any, more expansion or contraction than takes place in a 39-foot rail in usual track construction. While many welds have been developed by electric railroads, Mr. Clarke declared that in his opinion the steam railroads on main track must make a weld which duplicates the condition of the remainder of the rail, a butt weld with the properties of the rail, with no bars or plates to interfere with the wave motion of the rail or stress changes. Outlining the various welding methods in joining rails in Europe, Mr. Clarke described the development of the improved thermit pressure weld from the straight collar weld, the thermit fusion weld being used at the base and web of the rail with a heat pressure weld on the head or ball of the rail.

In its first experiments in welded joints for longer stretches of track, Delaware & Hudson, co-operating with the Metal & Thermit Corp., New York, laid lengths from 500 to 2800 feet in Albany, N. Y. district, 300 welds being made. The welds were made in August. Ends of the welded stretches of rails were connected with regular track joints and in one instance an expansion joint was installed. In all temperatures the joint-connected rails showed no greater tendency to expand or contract than was the case with 39-foot rail ends.

### Weld Joints Consecutively

Five welds failed and study of these failures showed two due to defective welds. Three failed in extreme cold weather, all on one track, but none in the longest stretch undergoing the test. Failures were traced to welds left for expansion during the process of the work, which as before mentioned was done in hot weather. On the sections where no failure took place all welds were made consecutively. For more than a year this track has been satisfactory and much smoother in operation.

This winter will bring the first test at low temperatures of track welded with partially machined ends, approximately 2000 feet long at Mechanicsville, N. Y. Mr. Clarke also stressed the importance of shipping at least 90 per cent of each heat together, so that rails of the same heat can be laid together. Summarizing experience in long rail lengths made possible by joint welding, Mr. Clarke stated advantages included saving in maintenance costs, longer life due to elimination of joint batter, labor saving in laying due to this longer life, elimination largely of bond joints, saving in maintenance of rolling stock, motive power and smoother riding with joint pounds eliminated.

NO WORK of any note has been reported covering impact tests of fusion welds at sub-zero temperatures, according to R. K. Hopkins, M. W. Kellogg Co., Jersey City, N. J. Since this type of welding has been so universally accepted by industry, it naturally becomes important to know the mechanical characteristics of the weld at its operating temperature. Much work has been done in this connection at high temperature, but little if any for temperatures below zero Fahr., he declared.

The six commercial steels selected for the tests were carbon-molybdenum; carbon-silicon; plain low-carbon; 2¼ per cent nickel; 3½ per cent nickel; and carbon-vanadium. All welds were made between two 9 by 18-inch plates with welds extending along the 18-inch edge.

### Grain Size a Factor

In his conclusions Mr. Hopkins explained that grain size decidedly affected the impact resistance at all temperatures. The smaller the grain the higher was the impact resistance for any single steel tested. A predominance of large grained ferrite seemed to be detrimental to good low-temperature impact resistance, while a fine-grained well dispersed pearlitic structure was distinctly beneficial. That chemical analysis contributed as much, or more, toward the control of impact resistance, than grain size, was another point brought out. The low-temperature impact resistance of the 3½ per cent nickel steel was no better than that of the 2¼ per cent nickel steel. Brinell hardness does not change because of exposure to -50 degrees Fahr. for a period of one hour, he also found.

In part two of his paper he covered molybdenum and vanadium welds on nickel steel plate. Mr. Hopkins' conclusions in this case set forth that the low-temperature impact resistance of a vanadium or molybdenum weld on a 2¼ per cent nickel steel plate, although acceptable, is not as good as that obtained on the same welds while welding

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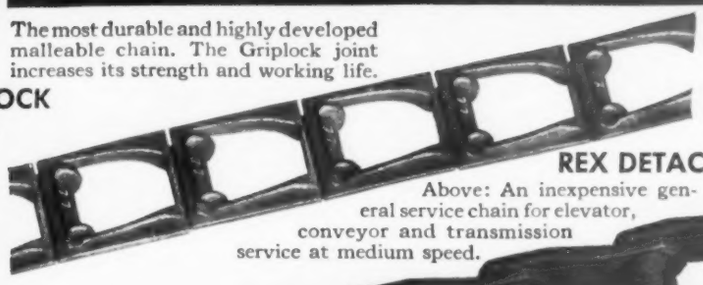

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Above: An inexpensive general service chain for elevator, conveyor and transmission service at medium speed.

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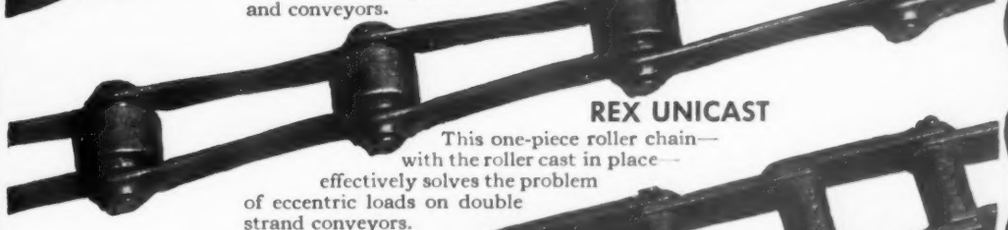

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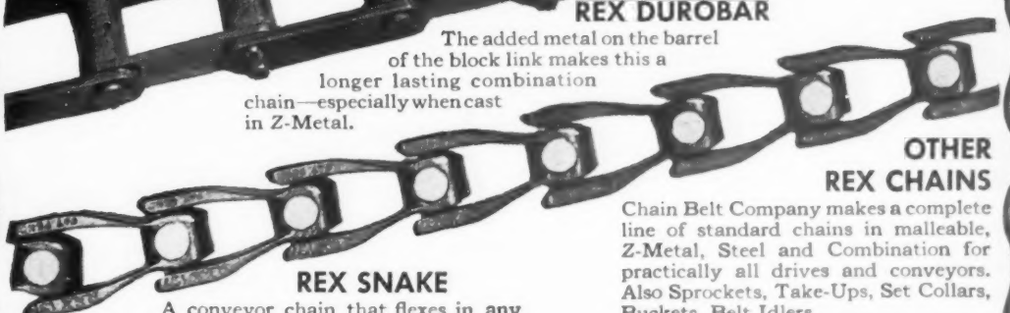

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vanadium and molybdenum steel plates, respectively.

Conclusions made by the speaker in regard to fabrication of a nickel steel vessel set forth that the welding of 2¼ per cent nickel steel tanks on a production basis is entirely feasible. High nickel content in weld metal is not necessary to obtain good low temperature impact resistance. Normalization of hot spun 2¼ per cent nickel steel heads is essential to maintain acceptable impact resistance at low temperatures. It is imperative to guard against materials containing dendritic structures. Acceptable field welds can be made on 2¼ per cent nickel steel pipe. Local stress relief of welds on 2¼ per cent nickel steel pipe has no detrimental effect on the pipe, he asserted.

Alternating-current arc welding has become the accepted best method for the highest type of arc welding, namely that of pressure vessels, C. J. Holslag, Electric Arc Cutting & Welding Co., contended in his discussion of the acceptance of A. C. welding. In this country at least, he said, practically all the companies complying with the boiler code requirements for class 1 vessels use alternating current for the reason that it makes a better weld deposit, finer grain structure and less slag and gas inclusions.

### Explains Theories Involved

"Arc welding is a combination of metallurgical and electrical engineering and," continued Mr. Holslag, "I believe from observation that alternating current so agitates the molten puddle that during solidification the crystal growth is aided." The aid comes in two ways, he explained; first by the mechanical agitation through the alternating-current magnetic influence, and second, but not secondarily, the reversal action of 50 or 60-cycle current keeps the puddle molten so as to allow more time for the desired finer grain structure to grow, and this extra time is the explanation of the less gas and dross inclusion.

"Alternating current lends itself admirably to automatic arc welding conditions," he continued. "The apparatus is all too simple. A drive motor with two circuits and a fixed field will feed downward on the arc voltage balanced against a fixed or reactance voltage and upward on short circuit or overbalance of the fixed or reactance voltage. There are no relays, switches or timed action; the control is inherent; the response is immediate and not subject to sequence."

Automatic alternating-current arc welding class 1 pressure vessels was discussed by O. A. Tilton, General Electric Co., Schenectady, N. Y. preceded by a study of alternating-current arc welding circuit characteristics, with A. M. Candy, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., as the speaker.

ONE of the best attended sessions of the welding society meeting was devoted to a symposium on qualifying operators of welding equipment. A number of speakers were strongly of the belief that there is too much fussiness, about testing welders as to their qualifications. One speaker in particular, Harry W. Pierce, New York Shipbuilding Corp., took the attitude that if a man once qualifies as a good welder he automatically will continue to be a good welder.

"When a man has shown that he knows how and is welding more or less steadily," said Mr. Pierce, "the repetition of tests can only show that he still knows how. It is like asking a bookkeeper to add a column of figures once a month to qualify in arithmetic. If a man has been out of welding for more than, say, three months, we believe it wise to check him before he goes on production work of any importance, to see that

he has his hand in again. And it is well to hold the possibility of re-test over a man if his work shows lack of care, or other fault."

Unification of codes and inspection rules is greatly needed, said Mr. Pierce. Naval work in ship yards, for instance, comes under two bureaus of the Navy having different welding qualification tests. In addition, commercial work in such a yard comes under the rules of the steamboat inspectors and, generally, under the American Bureau of Shipping and Lloyds' Register, or both.

"Every production operator, excluding only helpers and apprentices, is qualified by the test prescribed by the bureau of construction and repair, United States navy," continued Mr. Pierce. "The other bodies have accepted this qualification and certification for their work, in all but a few instances. Our grievance is, therefore, not with conditions as they are, but the possibility of the rules as they now stand. A yard employing, say, 100 welders, might have to qualify to five rules, either doing this to all employed or keeping an elaborate check, to be able to show that John Doe could weld tanks on the U. S. S. BLANK, but not similar tanks on the S. S. WHOOSIS, if the American Bureau were classifying the job, but could if it were Lloyds, or vice versa or any number of combinations. The need of a uniform and enforceable rule is obvious."

A majority of speakers, however, favored periodical tests of welders and it was clear from the general discussion that the performance of the average welder varies from time to time. G. D. Fish, Westinghouse Electric & Mfg. Co., expressed a viewpoint which received a number of endorsements. He was in favor of periodic tests, with test specimens for each welder to be available to inspectors. At the same time Mr. Fish admitted that these test specimens did not tell the whole story. He cited instances where a welder may produce a fine test weld but be a poor operator on production welding and vice versa.

Alexander Kidd, M. W. Kellogg Co., expressed a somewhat similar viewpoint. Where the manufacturer is equipped with X-ray apparatus, tests made by this method should be considered sufficient to qualify the shop. But where such inspection cannot be made, periodical tests of the qualifications of the welders are necessary.

### Restrictions Are Necessary

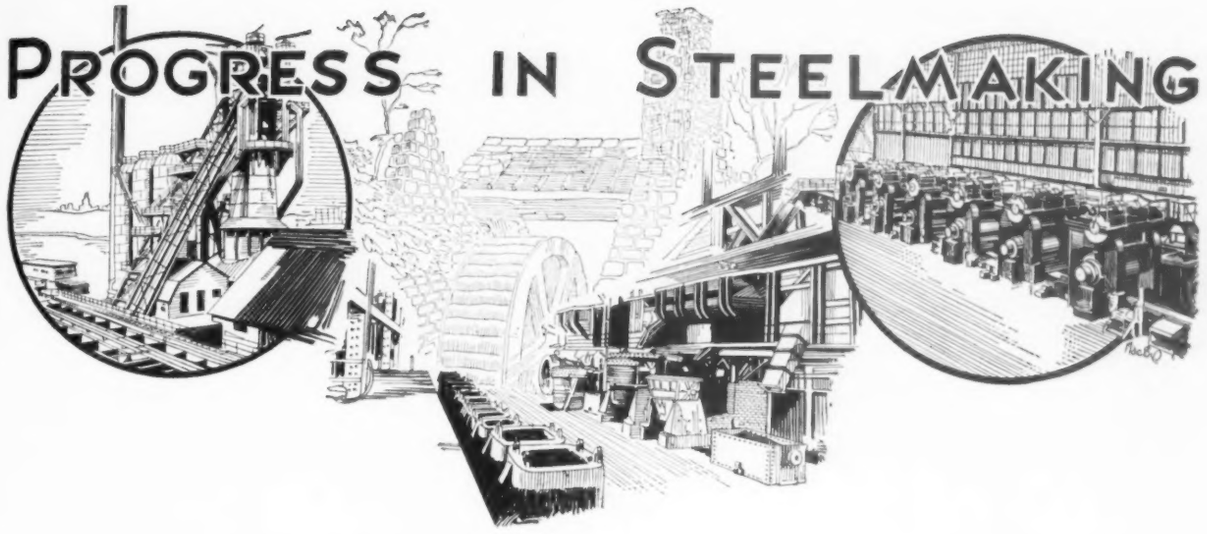
The owners' side of the controversy was expressed emphatically by L. C. Bibber, navy department. It is only natural for fabricators to resent the restrictions placed upon them but it is necessary for an owner, such as the navy, to guard against unscrupulous contractors. To indicate the problem of inspection with which the navy is faced Mr. Bibber said that between 1000 and 1200 welders are engaged on naval construction at the present time. Hence, the navy is unable to take anything for granted.

A representative of the Detroit Edison Co. explained how that company makes use of periodical tests to set up an incentive for the men. It has set up a special class of its best welders, paying the men in this class a substantial increase in compensation. At present, this class is comprised of four men and all of them are under the necessity of passing the tests in order to stay in the class. On the other hand, the rank and file operators are anxious to get in this special class.

Several speakers pointed out that a test of a welding operator should not be confused with a test of a welding machine or a welding method. This point was advanced by William D. Halsey, Hartford Steam Boiler Inspection & Insurance Co., in a paper discussing the qualifying of welding operators under the American Society of Mechanical Engineers' boiler and pressure vessel codes. Methods of investigating a process should be exhausted, he said, whereas methods of qualifying an operator of that process should be rather simple. John H. Zink, repre-

(*Please turn to Page* 56)

# PROGRESS IN STEELMAKING



TESTING cold drawn bars for uniformity is accomplished at a plant in the East by magnetic analysis. A standard steel of the same material and size is employed. Steel bars of essentially the same percentage of carbon but some containing 3 per cent nickel and some 5 per cent nickel readily are assorted as a matter of regular practice. Magnetic analysis permits the producer to guarantee cold drawn bars free from seams.

• • •

Transferring buttweld tubing from the runout table to a cooling bed at a mill in the Pittsburgh district is accomplished automatically by a flag switch. When the tube in transit on the runout table travels a predetermined distance it engages a flag switch. This causes a solenoid to indirectly operate pivoted arms which transfer the lengths of tubing from the runout table to the cooling bed.

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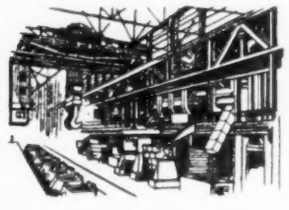
Sensitive thermal conditions in open-hearth furnaces recently were disclosed by the newly developed carbon and silica carbide thermo-



couple. One of these couples was inserted in the wicket hole of the checkers, another in the downtake and another just before the first pass of the checkers. The latter thermocouple extended 15 inches in the gas stream and in this position the sensitivity of the furnace was observed When No. 1 charging door was opened the pyrometer showed a drop in temperature from 26 to 30 degrees Fahr. When No. 2 door was opened the decrease in temperature amounted to 80 degrees. Shortly after No. 3 door was opened the temperature receded 145 degrees.

• • •

An Ohio steelmaker who favors tar as a mold wash states that molds dipped at a temperature of 400 degrees Fahr. retain a uniform coating.

• • •

Shaking unsolidified ingots to eliminate gases in the steel and to confine segregation at the top of the ingot is being practiced by an Ohio steelmaker. As a result of this recent development in pouring practice, the plant has effected a 40 per cent reduction in the quantity of pit scrap produced and has lowered chipping costs materially.

• • •

Uniform circulation and heating of pickling baths and maximum economy are claimed for an improved steam injector. The fitting comprises a heavy-walled T-shaped body of lead, which lies flat on the bottom of the tank. The steam inlet pipe extends downward against the side wall of the tub, projects on a gradual curve through the cross branch of the T-shaped body and directs a jet of steam into the central stem of the T. In operation the acid is drawn in opposite directions through the two large openings at the ends of the cross branch, and is aspirated by the steam jet into the central stem, wherein the acid is heated and returned in definite directions into the body of the bath. Installations demonstrate that the erosive action of the steam and hot acid on the walls of the injector and tank is minimized, thus insuring longer life of the injector and tub lining. The new type injector eliminates violent hammering, or reduces it to a point where it no longer is objectionable.

• • •

Time required to reduce coarse particles of iron ore in a blast furnace increases directly with the diameter of the pieces, according to a study made by the bureau of mines. With porous sinters the solid continuous sections may be as thick in ¾-inch as in 1½-inch pieces. Large pieces of hard, dense sinters appear to be objectionable, particularly if produced from siliceous material.

• • •

Approximately 80 per cent of the cost of a new casting was saved at an Ohio plant by welding a 3-ton head of a forging machine which had been broken in three pieces. The fractures were prepared for welding by first cutting away a small quantity of the metal and inserting several steel studs in the surfaces to be joined for the purpose of imparting

a certain amount of mechanical strength. About 200 pounds of electrode metal was bonded by current from an arc-welding generator at a cost of $200 compared to a replacement cost of $1000.

# . . . are easily machined when SUNOCO is used

STEELS of high-grade physical characteristics and free machining properties are widely available. But to machine them economically, with accuracy and desired finish, these three important factors must be present:

—Modern machine tools.

—Correct tooling.

—*An efficient cutting lubricant.*

**Clean and Accurate Cuts Made With Sunoco**

Small tools which dull rapidly are doubly disadvantageous: They tear the metal . . . inaccurate tolerances and faulty finishes result. Such work fails to pass inspection.

With Sunoco Emulsifying Cutting Oil, tools make cuts that are clean and accurate. Resharpening and resetting are reduced to a minimum —and the percentage of work to pass inspection is increased.

**Operators Appreciate Sunoco's Advantages**

The superior lubricating and refrigerating qualities of Sunoco are acclaimed by machine operators. Experience has shown them that when Sunoco is utilized, they are assured of *continued, dependable, trouble-free machine tool performance.*

The Sun Oil Company offers the services of its Cutting Oil Engineers to help the industry in the application of Sunoco to specific metal cutting operations.

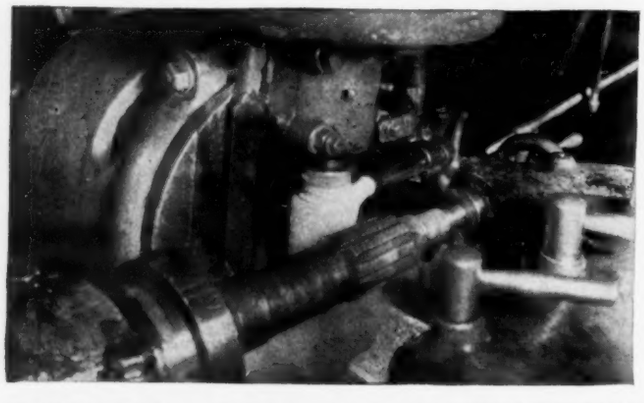
**Operation:** Cutting splines on final drive shaft.
**Machine:** Lees Bradner 5 AC Hobber
**Material:** SAE 3145
**Feed:** .050 inch
**Speed:** 80 feet per minute
**Lubricant:** 1 part Sunoco to 10 parts water

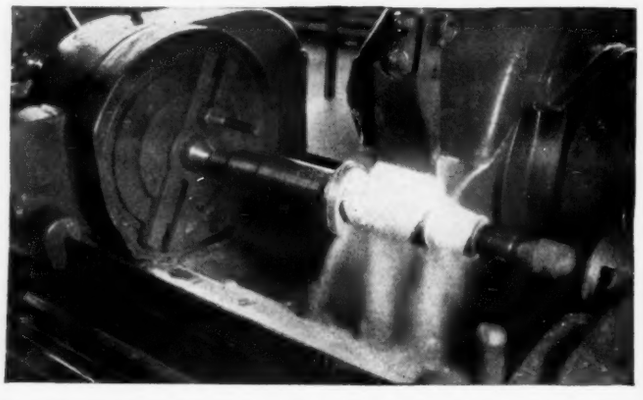
*Courtesy of*
**Cleveland Tractor Co.**
*Cleveland*

**SUNOCO**
**EMULSIFYING**
**CUTTING OIL**

**Operation:** Finish grinding lower bearing and shoulders on track wheel shaft
**Machine:** Norton Grinder
**Material:** SAE 1035
**Stock Removed:** .025 inch (.010 inch on shoulder)
**Wheel:** 24 in. diam., 5½ in. wide
**Wheel Speed:** 1050 r. p. m.
**Surface Speed:** 68 ft. per min.
**Coolant:** 1 part Sunoco to 40 parts water.

*Courtesy of*
**Cleveland Tractor Co.**
*Cleveland*





**SUN OIL COMPANY** PHILADELPHIA, PA., U. S. A. *Offices and Warehouses in more than 100 Cities*
*Subsidiary Companies* • Sun Oil Co., Ltd., Montreal & Toronto • British Sun Oil Co., Ltd., London, England

# NEW EQUIPMENT

PRODUCTION FABRICATION
TREATMENT FINISHING

**Turret Lathe**—Warner & Swasey Co., Cleveland, recently announced a new 1-inch bar capacity turret lathe capable of 1480 revolutions per minute and with an improved bar feed mechanism. The unit, shown herewith, is equipped with a 6-speed all geared head with speed ranges from 67 to 740 revolutions per minute up to from 134 to 1480 revolutions per minute. A two-speed motor makes 12 speeds possible with a range from 67 to 1480 revolutions per minute.

The head has sufficient power for heavy-duty work with cemented tungsten carbide tools. A single pulley constant speed drive makes the full horsepower available at all six speeds. The forward and reverse multiple disk clutch has ample area to allow reversing even at high speeds. A four to one ratio high-low clutch makes possible the instant shifting from turning to threading or reaming speeds, or vice versa, without stopping the spindle.

A new type automatic circumference binder ring, which permits the clamping and indexing of the hexagon turret by a rotation of the turnstile, is incorporated in this turret lathe. This is an important factor in high speed work.

Since high spindle speeds are essential, a new combination friction finger and ratchet bar feed has been designed which speeds up the operation and provides for the safety of the operator. Bars up to ⅝-inch diameter are advanced with a friction finger lying immediately behind the collet inside the spindle and enclosed throughout their length.

Bars above ⅝-inch diameter are fully enclosed at the rear end, being exposed only for the length of the ratchet feed stroke between the spindle end and the bar support tube. There is, of course, no danger of buckling in bars of this size when supported at both ends. By using the ratchet feed for the larger bars, it is possible to have a maximum 1-inch capacity with a spindle small enough in diameter to stand extremely high speeds.

The power feed is entirely new and has been designed especially for continuous operation at high speeds. The initial reduction from the spindle is by V-belt. The six feeds for the hexagon turret range from .003 to .030. There is an option of two change gears which will reduce the feeds by one-half.

♦ ♦ ♦

**Goggle**—Wilson Products Inc., Reading, Pa., recently announced a new style DC50 goggle which combines the protective qualities of both chippers' and welders' types in one design. The top view in the accompanying illustration shows the goggle arranged for welders. Wilson weld lenses in this case provide protection against dangerous light rays, glare, etc. The "super-tough" lenses in the lower view offer protection against impact, flying chips, etc. The goggle is used open for chipping and closed for welding. Other features include ample ventilation through indirect ports, an adjustable leather nose bridge and elastic headband.

*Wilson goggle offers protection to both chippers and welders*

♦ ♦ ♦

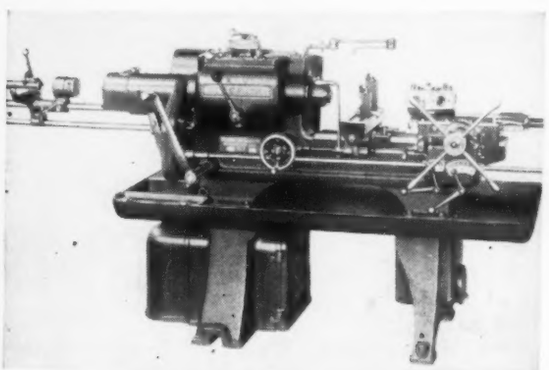
**Tool Hardening Furnace**—Surface Combustion Corp., Toledo, O., recognizing the movement toward improved appearance in modern industrial design, has developed a new standard furnace which, as shown herewith, typifies this trend. It is in reality one of the SC standard muffle type, atmosphere furnaces for hardening high speed steels. Many of these furnaces have been built along conventional lines. The new one illustrated here is merely one of the standard units with "a new dress." The wide spread attention attracted by this furnace at the National Metal congress indicated that industry not only appreciates correct and dependable performance of equipment, but also appreciates up-to-date appearance.

*Surface Combustion Corp. furnace reflects modern design trend*

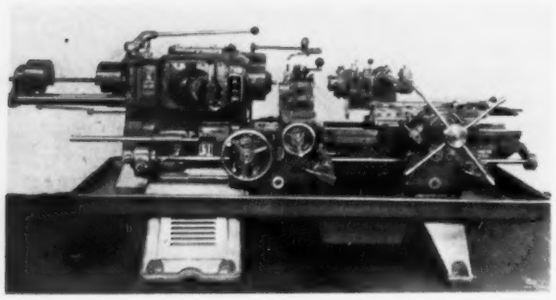
♦ ♦ ♦

**Turret Lathe**—Jones & Lamson Machine Co., Springfield, Vt., is introducing a new universal ram type turret lathe line. The machines are of completely new design and have many new productive features. They are built in two sizes 1½ and 2½ inch bar capacity. Fundamental purpose of this new design, shown on page 54, is to permit the use, at the highest efficiency, of the latest types of carbide cutting tools with ample margin for future developments in that field.

A single lever dial selector controls all speed changes. One lever



*A FEATURE of this Warner & Swasey turret lathe lies in the possibility of arranging the cross slide as a lever feed or screw feed type, or a combination of the two, by simply substituting the required parts in the cross slide*



*JONES & LAMSON turret lathe incorporates a safety friction clutch in the apron. For turning or boring tapers a standard taper attachment is bolted to the rear of the carriage. A thread chasing attachment also is standard equipment*

controls the forward and reverse motion of the spindle and when it is moved to the neutral position an adjustable brake for stopping the spindle is automatically applied. The forward and reverse clutches and the brake are of multiple disk type.

The machine has twelve selective forward and reverse spindle speeds, two ranges of which are standard equipment, namely: 20 to 1000 or 40 to 2000. This range covers the requirements of all cutting tools from carbon steel to carbide.

The carriage is the universal bridge type and is made exceptionally heavy for support of the many tools that may be in operation at one time. T-slots in the front and rear of the carriage cross slide provide for multiple tooling. Standard equipment includes a square turret on the front and a dovetail tool slide on the rear.

Carriage apron is equipped with a sliding gear transmission for nine variable longitudinal and cross feeds, all controlled with a single lever dial selector. All feeds can be changed while the machine is running. The range of feeds for longitudinal travel is from .005 to .100 and the cross feed range is from .0025 to .050 per revolution of the spindle.

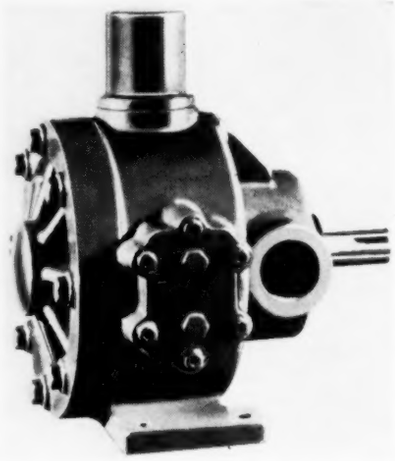
The carriage is equipped with a spool stop for longitudinal feeds and an adjustable stop bar, also a spool stop for the cross feed with adjustable stop dogs which will disengage the feed in either direction. Feed for the carriage is automatically disengaged as the carriage comes in contact with a stop, or it can be manually tripped. The feed knock off, is against a positive stop. The apron is provided with a feed reversing lever.

The machine is fitted with a hexagon turret with all faces bored, counterbored and drilled for mounting standard bar and chucking tools. It is indexed from one position to the next with a star wheel. The turret is equipped with an automatic clamp ring. On the return movement of the slide the turret is unclamped, indexed to the next position and on the forward motion automatically clamped.

A manually operated lever on the front of the saddle disengages the indexing mechanism so that the turret can be indexed by hand in either direction.

♦ ♦ ♦

**Hydraulic Pump**—Racine Tool & Machine Co., Racine, Wis., just announced a variable volume hydraulic pump, shown herewith, which embodies greatly simplified design, improved efficiency and sensitive control. Constant pressure of 500



*Racine variable volume hydraulic pump of multiple vane type*

pounds per square inch, with momentary pressures up to 1000 pounds, are available in three sizes of pumps with volume ranges from zero to to 2000, 4000 and 6000 cubic inches per minute. These three sizes are furnished in one size of pump case, the variations in capacity being obtained by varying the width of pumping rotor.

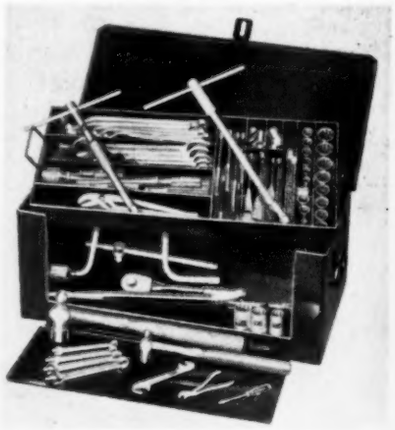
Automatic control is provided by a piston type of hydraulic governor which reduces volume automatically a sufficient amount to maintain any desired line pressure. With this device the pump may be operated at full volume until a predetermined pressure is reached. The hydraulic governor then reduces the pumping chamber so that only sufficient oil is pumped to hold the desired line pressure.

The automatic control as described has decided advantages in such applications as presses, grinding machines, die casting machines, planers, chucking operations, lifts, stokers, broaches and most machines generally operated by hydraulic means.

♦ ♦ ♦

**Wrench and Tool Set**—Bonney Forge & Tool Works, Allentown, Pa., recently brought out a "Double B" wrench and tool outfit, shown herewith, which consists of 72 sockets, wrenches and tools. The set contains 14 double-hexagon standard series (½-inch square drive) sockets, with openings of from 7/16 to 1 inch as well as three extra deep (spark plug) sockets, two square opening sockets and eight handles and attachments, all of the standard series. Open-end and box wrenches included are four "Zenel TuType" wrenches with openings of 7/16, ½, 9/16, ⅝-inch, six engineers' wrenches with openings ranging from ⅜ to 1-inch, four tappet wrenches (two of each size) with openings of ½, 9/16, ⅝ and 11/16-inch. Also four double-hexagon box wrenches with openings of ½, 9/16, ⅝, 11/16 and ¾-inch, and a right-angle wrench with openings of ½ and 9/16 inch.

A popular selection of chisels and punches has also been made, consisting of three flat chisels, a cape and diamond point chisel, two pin punches, two solid punches, a long taper punch, a center punch and a pry or pinch bar. In addition, seven screw drivers are included, as follows: Pocket size, two electricians' (one with neon tube in handle) two round shank, one square shank and an adjusting screw driver. Miscellaneous items consist of a gasket hammer, a 1-pound ball pein hammer and two pliers of the adjustable and ignition types, also ½-inch square drive stud wrench and a drag link socket.



*Bonney "Double B" wrench and tool set comes in metal chest*

# "Shield-Arc" builds a better base

## . . . and cuts cost of Welding

THINK of how much *"Shield-Arc"* welding can give you. It allows greater freedom of design . . . more efficient use of material . . . reduces weight . . . improves the structure . . . speeds production. These are big advantages, but *"Shield-Arc"* gives you all these—and more.

*"Shield-Arc"* allows you to get the most out of welding. It welds faster. Makes better welds. Uses less power. Puts more of the electrode into the weld. Eleven distinctive features of the *"Shield-Arc"* welder make it give you more weld per dollar . . . and better welds. That's why more Lincoln welders are in use today than any other make. And why many are scrapping their old type machines for *"Shield-Arcs."* Find out how much *"Shield-Arc"* welders can save you. *Ask* The Lincoln Electric Company, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

**LINCOLN "SHIELD-ARC" WELDERS**

W-84

# Stainless Steel Wins New Laurels in Dairy Equipment Applications

THAT the dairy industry and the allied dairy equipment manufacturers comprise probably the best single group of customers served by producers of stainless steels was strikingly apparent to an observer at the Eighth Dairy Industries exposition, promoted and managed by the Dairy & Ice Cream Machinery & Supplies association, and held Oct. 15-20 in the underground exhibition hall of Cleveland public auditorium. The display is one of the largest industrial exhibitions staged in this country and nearly 250 exhibitors took part.

A cursory glance over the entire show emphasized one point—the almost universal application of 18-8 stainless steel in such dairy equipment as tanks, mixers, separators, coolers, filters, cabinets, cans, sterilizers, filters, strainers, irradiators, and other dairy devices. Ease of cleaning, bright appearance and resistance to nearly all corrosive agents make this material ideal for use in such equipment. The fact that the industry generally is able financially to afford stainless steel equipment only makes the selling problem that much easier.

### Steel Producers Exhibit

In recognition of the widespread acceptance of stainless steels by the dairy industry, a number of leading steel producers sponsored exhibits at the show, featuring their products in a variety of sizes and shapes.

American Sheet & Tin Plate Co., American Steel & Wire Co., Carnegie Steel Co., Illinois Steel Co., and National Tube Co., all subsidiaries of the United States Steel Corp., cooperated in an extensive display of USS corrosion-resisting steels used in such items as sinks, pasteurizers, bottle filler and capper, a new Wallace-type joint for use in connection with stainless pipe and tubular products, and an assortment of bars, shapes and plates.

Republic Steel Corp. featured its Enduro 18-8 chrome-nickel steel, adapted to an ice cream cabinet, display case, small products used in the dairy field and samples of stainless tubing. Also shown were various finishes obtainable on stainless steel, of particular interest being a 5 x 15½ foot sheet with a so-called No. 4 finish.

How Allegheny metal (18-8 steel) is used in the dairy industry was the theme of the exhibit arranged by the Allegheny Steel Co. Similarly, the Crucible Steel Co. of America showed dairy uses of its Rezistal stainless steel.

Stainless-clad steel used in a 175-gallon test tank was displayed by the Alloy Products Corp., as well as a stainless steel milk filler bowl and a variety of metal fittings and samples.

An interesting display of milk cans, ice cream packing cans, strainers, stirrers, samplers and other pressed steel products was sponsored by the Buhl Stamping Co. Larger pieces of dairy equipment, much of which embodied stainless steel in one form or another, were stationed at the booth of the Cherry-Burrell Corp.

Two 2200-gallon stainless steel streamline truck tanks, mounted on two different truck chassis, attracted attention at the exhibit of the Pfaudler Co., where also to be seen were various types of glass-lined steel equipment.

Other metals used in dairy equipment were shown by the Aluminum Co. of America and International Nickel Co. Inc., the former displaying aluminum and aluminum alloys, the latter mill and fabricated forms of solid nickel and inconel alloy for dairy plant equipment.

Space limitations prevent mention of the thousands of other items on display and in daily use in the country's dairies. Each successive dairy exposition reveals marked progress in perfection of materials and equipment, and a trip through the hundreds of exhibits is ample testimony to the ingenuity and forward-looking efforts of the nation's equipment manufacturers.

## Argue Pro and Con of Weld Qualification Tests

(*Concluded from Page* 50)

senting the Heating, Piping and Air Conditioning Contractors National association, touched on uncertainties as to the quality of welding rods and recommended that a move be organized to have all welding rods certified as to quality.

When the Bethlehem Shipbuilding Corp. was awarded contracts for two heavy cruisers and four 1850-ton destroyers in 1933, it was estimated that a total of 650,000 pounds of welding electrodes would be required and that the peak labor load would be about 200 operators. The company has organized a school for training of welders. E. D. Debes of that company described the course of instruction being administered in this school to a class of prospective welders.

James W. Owens, director, National Weld Ttesting Bureau, Pittsburgh, in a paper entitled "Pre-Construction Weld Testing" pointed out the existing duplication in expense incurred in inspection and tests by various bodies, such as government departments, casualty insurance companies, regulatory and other bodies. He also pointed out the lack of uniformity of tests and test requirements under the various fusion welding codes. With reference to the first point, Mr. Owens said that with the assistance of the organization with which he is associated, a constant repetition of tests now can be avoided. With respect to the second point, Mr. Owens recommended the preparation of a basic "A.W.S. Weld Testing Code for Fusion-Welded Products," this code to be in three parts, covering a pre-construction weld testing code, a construction weld testing code and a proof testing code; the code also should have an appendix providing for code enforcement, etc.

## Trade Publications

GRINDER—A horizontal grinder is described in a current cuircuar by Williams, White & Co., Moline, Ill. A description of this grinder appeared in STEEL, Sept. 17, page 48.

COMPRESSORS—Worthington Pump & Machinery Corp., Harrison, N. J., has issued a bulletin on its type VA-2 air compressor unit for garages, repair shops and service stations, illustrated in detail.

SHIELDED ARC WELDING—A booklet by the Lincoln Electric Co., Cleveland, discusses arc welding procedure and shows results of tests of welds made by this and other methods. Photomicrographs are shown to illustrate the effect on structure of metals.

ELECTRICAL EQUIPMENT—Electric Controller & Mfg. Co., Cleveland, has issued two leaflets. One covers its No. 120 weather-proof dust tight across-the-line motor starter, with illustrations and description. The other is devoted to a double-unit push button suited to a variety of circuits.

SPECIAL STEELS—Three publications by the Firth-Sterling Steel Co., McKeesport, Pa., are devoted to stainless steels in two types, high-speed steel and blue chip high-speed steel. They are illustrated and contain engineering data and tables of drawing data.

HYDRAULIC PACKING — Chicago Belting Co., 113 North Green street, Chicago, has issued a bulletin containing information on hydraulic packings, derived from the company's researches. Engineering service is offered for problems that arise in the experience of users.

FURNACES—Continuous controlled atmosphere furnaces form the subject of a bulletin No. 349, by W. S. Rockwell Co., 50 Church street, New York. This furnace is the conveyor belt type, with conditioned atmosphere, suitable for annealing, silver soldering, copper brazing and scaleless hardening.

# Markets Firmer; Steel Rate Advances to 26½

## Buyers Less Reluctant To Close, but Tonnage Gains Slowly—Automobile Output Up—Institute, Government Co-operate on Steel Frame Houses—Coke, Pig Iron More Active

A SLIGHTLY stronger situation has developed in the iron and steel markets through NRA's approval of the industry's code and price policies, and the apparent efforts at Washington to conciliate business.

While this did not result in any substantial increase in commitments last week, steelmakers believe it has cleared the way for a more definite improvement. Buyers generally showed less hesitation in closing for immediate requirements, and this lifted the steelworks operating rate 1½ points to 26½ per cent.

Specifications came in more freely from miscellaneous manufacturing industries, including agricultural implements; were moderately improved by the automobile industry, and held down to barest necessities by the railroads.

Continued strength in the retail automobile market was evident, when manufacturers increased their production of present models and accelerated preparations for new assemblies. Ford is making 1000 motors a day for its 1935 series. Automobile output increased from 19,000 in the first week of October to 25,000 in the second, and 30,000 in the third week.

### Army To Open Bids for $2,309,000 Worth of Machine Tools; More Industrial Building

An official statement by the American Iron and Steel institute citing advantages of steel framed houses indicates the industry is throwing some support to this development, co-operating with the federal housing administration's program. Two billion dollars is to be applied by the FHA to build houses, and if steel is used for framing 1,000,000 to 1,250,000 houses it would create a market for steel equal to that of the automobile industry this year.

In another practical direction the government showed evidence of aiding the capital goods industries, the army ordnance department to open bids in November and December on $2,309,000 worth of machine tools.

Small industrial building construction shows a tendency to expand. Among the larger projects launched during the week were the Continental Can Co.'s $100,000 plant at Houston, Tex., and a $350,000 plant for the National Refining Co. of Canada, Sarnia, Ont. Structural shape awards for the week totaled 14,973 tons, practically unchanged from the preceding week.

In view of the difficulty the government is having in inducing railroads to lay all the rails they purchased this year with federal loans, not much significance is attached at this time to reports that they are formulating 1935 rail budgets. New York Central has resumed repair work at its West Albany, N. Y., and Avis, Pa., car shops. Lehigh Valley railroad has reduced the number of coal cars to be purchased from 400 to 300, and the number of box cars to be repaired from 1500 to 1350.

### Russian Pig Iron Fails To Find Market in Eastern District; Gray Forge Reduced

Consumption of foundry coke and pig iron is expanding, while due to stocks the movement of scrap shows little improvement. Efforts to create a market for Russian pig iron in this country have not been successful, one sale of 100 tons having been closed recently.

Gray forge iron and other grades with a silicon content of less than 1.75 per cent, for which there has been little demand recently, have been reduced by raising the differential from 25 to 50 cents, below base. Nut and bolt prices and some classifications of screws have been reduced by an additional 10 per cent discount. Hot rolled ingot iron strip is down $2 a ton.

British foreign trade moved to the favorable side during September, according to STEEL's London cable. Iron and steel imports decreased 12,640 tons to 89,525 tons for the month, while exports increased 4599 tons to 193,412 tons. American exporters, however, are reported to be taking the largest share of business in the Far East.

Steelworks operations at Pittsburgh last week advanced 2 points to 20 per cent; eastern Pennsylvania 2 to 19½; Chicago 1 to 27; Cleveland 3 to 31; Youngstown ½-point to 30. Wheeling was off 10 to 23. Detroit was unchanged at 59; New England 40; Buffalo 24; and Birmingham 25 per cent.

STEEL's price composite are unchanged; iron and steel $32.09; finished steel $54; iron and steel scrap $9.37.

# COMPOSITE MARKET AVERAGES

| | Oct. 20 | Oct. 13 | One Month Ago Sept., 1934 | Three Months Ago July, 1934 | One Year Ago Oct., 1933 | Five Years Ago Oct., 1929 |
|---|---|---|---|---|---|---|
| Iron and Steel Composite | $32.09 | $32.09 | $32.15 | $32.32 | $30.53 | $35.85 |
| Finished Steel Composite | 54.00 | 54.00 | 54.00 | 54.05 | 49.20 | 56.79 |
| Steelworks Scrap Composite | 9.37 | 9.37 | 9.45 | 10.30 | 10.37 | 15.44 |

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip and cast iron pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

# A COMPARISON OF PRICES

**Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago**

| | Oct. 20, 1934 | Sept. 1934 | July 1934 | Oct. 1933 |
|---|---|---|---|---|
| **Finished Material** | | | | |
| Steel bars, Pittsburgh | 1.80 | 1.80 | 1.80 | 1.75 |
| Steel bars, Chicago | 1.85 | 1.85 | 1.85 | 1.80 |
| Steel bars, Philadelphia | 2.09 | 2.09 | 2.09 | 2.04 |
| Iron bars, Terre Haute, Ind. | 1.75 | 1.75 | 1.75 | 1.60 |
| Shapes, Pittsburgh | 1.80 | 1.80 | 1.80 | 1.70 |
| Shapes, Philadelphia | 2.00½ | 2.00½ | 2.00½ | 1.90½ |
| Shapes, Chicago | 1.85 | 1.85 | 1.85 | 1.75 |
| Tank plates, Pittsburgh | 1.80 | 1.80 | 1.80 | 1.70 |
| Tank plates, Philadelphia | 1.98½ | 1.98½ | 1.98½ | 1.88½ |
| Tank plates, Chicago | 1.85 | 1.85 | 1.85 | 1.75 |
| Sheets, No. 10, hot rolled, Pitts. | 1.85 | 1.85 | 1.85 | 1.75 |
| Sheets, No. 24, hot ann., Pitts. | 2.40 | 2.40 | 2.40 | 2.25 |
| Sheets, No. 24, galvan., Pitts. | 3.10 | 3.10 | 3.10 | 2.85 |
| Sheets, No. 10, hot rolled, Gary | 1.95 | 1.95 | 1.95 | 1.85 |
| Sheets, No. 24, hot anneal., Gary | 2.55 | 2.55 | 2.55 | 2.35 |
| Sheets, No. 24, galvan., Gary | 3.20 | 3.20 | 3.20 | 2.95 |
| Plain wire, Pittsburgh | 2.30 | 2.30 | 2.30 | 2.10 |
| Tin plate, per base box, Pitts. | 5.25 | 5.25 | 5.25 | 4.65 |
| Wire nails, Pittsburgh | 2.60 | 2.60 | 2.60 | 2.10 |
| **Semifinished Material** | | | | |
| Sheet bars, open-hearth, Youngs. | $28.00 | 28.00 | 28.00 | 26.00 |
| Sheet bars, open-hearth, Pitts. | 28.00 | 28.00 | 28.00 | 26.00 |
| Billets, open-hearth, Pittsburgh | 27.00 | 27.00 | 27.00 | 26.00 |
| Wire rods, Pittsburgh | 38.00 | 38.00 | 38.00 | 35.00 |

| | Oct. 20, 1934 | Sept. 1934 | July 1934 | Oct. 1933 |
|---|---|---|---|---|
| **Pig Iron** | | | | |
| Bessemer, del. Pittsburgh | 19.76 | 19.76 | 19.76 | 19.26 |
| Basic, Valley | 18.00 | 18.00 | 18.00 | 17.00 |
| Basic, eastern, del. eastern Pa. | 19.76 | 19.76 | 19.76 | 17.76 |
| No. 2 foundry, del. Pittsburgh | 19.26 | 19.26 | 19.26 | 18.76 |
| No. 2 foundry, Chicago | 18.50 | 18.50 | 18.50 | 17.50 |
| Southern No. 2, Birmingham | 14.50 | 14.50 | 14.50 | 13.50 |
| No. 2X eastern, del. Philadelphia | 20.63 | 20.63 | 20.63 | 17.76 |
| Malleable, Valley | 18.50 | 18.50 | 18.50 | 17.50 |
| Malleable, Chicago | 18.50 | 18.50 | 18.50 | 17.50 |
| Lake Superior charcoal, del. Chi. | 23.54 | 23.54 | 23.54 | 23.54 |
| Gray forge, del. Pittsburgh | 18.88 | 18.88 | 18.88 | 18.38 |
| Ferromanganese, del. Pittsburgh | 89.79 | 89.79 | 89.79 | 87.24 |
| **Scrap** | | | | |
| Heavy melting steel, Pittsburgh | $10.25 | 10.75 | 12.00 | 12.45 |
| Heavy melt. steel, No. 2, east. Pa. | 8.00 | 8.00 | 8.40 | 9.20 |
| Heavy melting steel, Chicago | 8.75 | 8.65 | 9.55 | 9.35 |
| Rails for rolling, Chicago | 9.75 | 10.05 | 10.85 | 11.10 |
| Railroad steel specialties, Chicago | 9.75 | 9.80 | 10.50 | 10.50 |
| **Coke** | | | | |
| Connellsville, furnace, ovens | 3.60 | 3.60 | 3.60 | 3.25 |
| Connellsville, foundry, ovens | 4.60 | 4.60 | 4.60 | 3.85 |
| Chicago, by-product foundry, del. | 9.25 | 9.25 | 9.25 | 8.75 |

# Steel, Iron, Raw Material and Metals Prices

*Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week*

## Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

| | |
|---|---|
| Pittsburgh, base | 1.85c |
| Gary, base | 1.95c |
| Chicago, del. | 1.98c |
| New York, del. | 2.18c |
| Philadelphia, del. | 2.14c |
| Birmingham, base | 2.00c |
| St. Louis, del. | 2.17c |
| F.o.b. cars, dock, Pacific ports | 2.40c |

HOT ROLLED ANN. No. 24

| | |
|---|---|
| Pittsburgh, base | 2.40c |
| Gary, base | 2.50c |
| Chicago, del. | 2.53c |
| Detroit, del. | 2.60c |
| New York, del. | 2.73c |
| Philadelphia, del. | 2.69c |
| Birmingham, base | 2.55c |
| St. Louis, del. | 2.72c |
| F.o.b. cars, dock, Pacific ports | 3.05c |

GALVANIZED No. 24

| | |
|---|---|
| Pittsburgh, base | 3.10c |
| Gary, base | 3.20c |
| Chicago, del. | 3.23c |
| Philadelphia, del. | 3.39c |
| New York, del. | 3.43c |
| Birmingham, base | 2.25c |
| St. Louis, del. | 3.42c |
| San Francisco, f.o.b. cars, dock | 3.70c |

TIN MILL BLACK No. 28

| | |
|---|---|
| Pittsburgh, base | 2.75c |
| Gary, base | 2.85c |
| St. Louis, del. | 3.07c |

COLD ROLLED No. 10

| | |
|---|---|
| Pittsburgh, base | 2.50c |
| Gary, base | 2.60c |
| Detroit, delivered | 2.70c |
| Philadelphia, del. | 2.79c |
| New York, del. | 2.83c |
| F.o.b. cars, dock, Pacific ports | 3.10c |

COLD ROLLED No. 20

| | |
|---|---|
| Pittsburgh, base | 2.95c |
| Gary, base | 3.05c |
| Detroit, delivered | 3.15c |
| Philadelphia, del. | 3.24c |
| New York, del. | 3.28c |

ENAMELING SHEETS

| | |
|---|---|
| Pittsburgh, No. 10 | 2.50c |
| Pittsburgh, No. 20 | 3.10c |

## Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher.

| | |
|---|---|
| Tin plate, coke base contract | $5.25 |
| Do., stock | $4.90 |
| Long ternes, No. 24 unassorted | 3.40c |

## Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets 35c; plates, 28c; bars, 24c; hot-rolled strip, 24.50c; cold-rolled strip, 32.00c

| | A | B | C | D |
|---|---|---|---|---|
| Bars | 17c | 18.5c | 21c | 26c |
| Plates | 20c | 21.5c | 24c | 29c |
| Sheets | 25c | 28c | 31c | 35c |
| Hot strip | 17c | 18.5c | 21c | 26c |
| Cold strip | 22.5c | 24c | 27c | 35c |

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 19/23% inc., D over 23/30%.

## Steel Plates

| | |
|---|---|
| Pittsburgh, base | 1.80c |
| New York, del. | 2.08c |
| Philadelphia, del. | 1.98½c |
| Boston, del. | 2.20c |
| Buffalo, del. | 2.03½c |
| Chicago or Gary base | 1.85c |
| Cleveland, del. | 1.98½c |
| Birmingham, base | 1.95c |
| Coatesville, base | 1.90c |
| Sparrows Pt., base | 1.90c |
| Pacific Coast, f.o.b. cars, dock | 2.35c |
| St. Louis, del. | 2.07c |

## Structural Shapes

| | |
|---|---|
| Pittsburgh, base | 1.80c |
| Philadelphia, del. | 2.00½c |
| New York, del. | 2.05¼c |
| Boston, del. | 2.18½c |
| Bethlehem, base | 1.90c |
| Chicago, base | 1.85c |
| Cleveland, del. | 1.98½c |
| Buffalo, base | 1.90c |
| Gulf ports | 2.20c |
| Birmingham, base | 1.95c |
| Pacific Coast, f.o.b. cars, dock | 2.35c |

## Bars

SOFT STEEL

| | |
|---|---|
| Pittsburgh, base | 1.80c |
| Chicago or Gary | 1.85c |
| Duluth, base | 1.95c |
| Birmingham, base | 1.95c |
| Cleveland, base | 1.85c |
| Buffalo | 1.90c |
| Detroit, del. | 1.95c |
| Pacific Coast ports cars, dock, c.i.f. | 2.35c |
| Philadelphia, del. | 2.09c |
| Boston, del. | 2.20c |
| New York, del. | 2.13c |
| Pitts., forg. qual. | 1.95c-2.05c |

RAIL STEEL
To Manufacturing Trade

| | |
|---|---|
| Pittsburgh, base | 1.70c |
| Chicago or Gary, base | 1.75c |
| Moline, Ill., base | 1.75c |
| Cleveland, base | 1.75c |
| Buffalo, base | 1.80c |

IRON

| | |
|---|---|
| Terre Haute, Ind. | 1.75c |
| Chicago | 1.80c |
| Philadelphia, base | 1.89c |
| Pittsburgh, refined | 2.75c-7.50c |

REINFORCING

| | |
|---|---|
| New billet, cut lengths, c. l. | |
| Pittsburgh | 2.05c |
| Chicago, Gary, Buffalo Cleve., Birm., Young | 2.10c |
| Gulf ports | 2.45c |
| Pacific coast ports f.o.b. cars dock | 2.45c |
| Philadelphia, del. | 2.34c |
| Rail Steel | |
| Pittsburgh, base | 1.90c |
| Chicago, Buffalo, Cleveland, Birm., Young | 1.95c |
| Gulf ports | 2.30c |

## Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

| Base, Pitts.-Cleve., 100 lb. keg | |
|---|---|
| Standard wire nails | $2.60 |
| Cement coated nails | 2.60 |
| Galvanized nails, 15 gage and coarser | 4.60c |
| Do., 16 gage and finer | 5 10c |
| (Per pound) | |
| Polished staples | 3.30c |
| Galvanized fence staples | 3.55c |
| Barbed wire, galv. | 3.00c |
| Annealed fence wire | 2.45c |
| Galvanized fence wire | 2.80c |
| Woven wire fencing (base column, c.l.) | $63.00 |
| Plain wire, 6-9 gage to mfg. trade | 2.30c |

Anderson, Ind., (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

| | |
|---|---|
| Spring wire | 3.20c |

Chicago, up $1, Worcester, $2.

## Cold-Finished Carbon Bars and Shafting □ □

Base Pitts., one size, shape, grade, shipment at one time to one destination

| | |
|---|---|
| 10,000 to 19,999 lbs | 2.10c |
| 20,000 to 59,999 lbs. | 2.05c |
| 60,000 to 99,999 lbs. | 2.00c |
| 100,000 lbs. and over | 1.97½c |

Gary, Ind., Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

## Alloy Steel Bars (Hot) □

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem ..... 2.45c

| Alloy S.A.E. | Diff. | Alloy S.A.E. | Diff. |
|---|---|---|---|
| 2000 | 0.25 | 3100 | 0.55 |
| 2100 | 0.55 | 3200 | 1.35 |
| 2300 | 1.50 | 3300 | 3.80 |
| 2500 | 2.25 | 3400 | 3.20 |
| 4100 .15 to .25 Mo | | | 0.50 |
| 4600 .20 to .30 Mo. 125-1.75 Ni. | | | 1.05 |
| 5100 .80-1.10 Cr. | | | 0.45 |
| 5100 Cr. spring | | | base |
| 6100 bars | | | 1.20 |
| 6100 spring | | | 0.70 |
| Cr., Ni., Van. | | | 1.50 |
| Carbon Van. | | | 0.95 |

9250....Carbon base plus extras

## Piling □ □

| | |
|---|---|
| Pittsburgh | 2.15c |
| Chicago, Buffalo | 2.25c |

## Strip and Hoops □

| | |
|---|---|
| Hot strip to 23¾-in. | |
| Pittsburgh | 1.85c |
| Chicago, base | 1.95c |
| Birmingham, base | 2.00c |
| Detroit, delivered | 2.05c |
| Phila., delivered | 2.14c |
| New York, del. | 2.18c |
| Cooperage hoop, | |
| Pittsburgh | 1.95c |
| Chicago | 2.05c |
| Cold-rolled strip, | |
| Pitts., Cleve. | 2.60c |
| Worcester, Mass. | 2.80c |

## Rails, Track Material □

(Gross Tons)

| | |
|---|---|
| Standard rails, mill | $36.37½ |
| Relay rails, Pitts. | |
| 24-45 lbs. | $27.00 |
| 50-60 lbs. | $24.00 |
| 70-75 lbs. | $18.00 |
| 80-85 lbs. | $25.00 |
| 100 lbs. | $26.00 |
| Light rails, billet qual., Pittsb., Chi. | $35.00 |
| Do., reroll. qual. | $34.00 |
| Angle bars, mills | 2.55c |
| Spikes, R. R. base | 2.40c |
| Track bolts, base | 3.55c |
| Tie plates, base | 1.90c |

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $8; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

## Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

| | |
|---|---|
| *All sizes, cut thrd. | 70-10-10-10 off |
| *Rolled thread, ½ x 6 and smaller | 70-10-10-10 off |

MACHINE BOLTS

| | |
|---|---|
| *All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts, without nuts | 70-10-10-10 off |
| *Tire bolts | 60-10-10 off |

Stove bolts, 75 off in pkgs.; 83 off in bulk, 15,000 or more of a size.

| | |
|---|---|
| *Rolled thread machine bolts, ½ x 6 and smaller | 70-10-10-10 off |
| *Step bolts | 70-10-10 off |
| *Elevator bolts | 70-10-10 off |

NUTS

| | |
|---|---|
| *S.A.E. semifinished hex.; ½ to ⅞-inch. | 70-10-10-10 off |
| Do., ½ to 1-inch | 75 off |
| *Do., over 1-inch | 70-10 off |

HEXAGON CAP SCREWS

| | |
|---|---|
| *Milled | 85-10-10-10 off |
| Upset 1-in., smaller | 85 off |

SQUARE HEAD SET SCREWS

| | |
|---|---|
| *Upset, 1-., small. | 75-10-10 off |
| *Do., over 1 in | 75-10-10 off |
| Headless set screws | 75 off |

## Rivets, Wrought Washers

| | |
|---|---|
| Struc., c. l., Pittsburgh, Cleveland | 2.90c |
| Struc., c. l., Chicago | 3.00c |
| ⅞-in. and smaller, Pitts., Chi., Cleve. | 70 and 5 off |
| Wrought washers, Pitts., Chi., Phila. | 6.00 off |

## Cut Nails □ □

| | |
|---|---|
| Cut nails, Pitts.; (10% discount on size extras) | $2.75 |
| Do. less carloads, 5 kegs or more no discount on size extras | $3.05 |
| Do. under 5 kegs; no discount on size extras | $3.20 |

## Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

## Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads, Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

Steel

| In. | Blk. | Gal. |
|---|---|---|
| ¼ and ⅜ | 53½ | 35 |
| ½ | 58½ | 47 |
| ¾ | 62 | 52 |
| 1—3 | 64 | 55 |
| Iron | | |
| ½ | 31½ | 15 |
| ¾ | 36½ | 20½ |
| 1—1¼ | 39½ | 25 7/8 |
| 2 | 41½ | 26 |

LAP WELD

Steel

| | | |
|---|---|---|
| 2 | 60 | 51 |
| 2½—3 | 63 | 54 |
| 3½—6 | 65 | 56 |
| 7 and 8 | 64 | 54 |
| 9 and 10 | 63½ | 53½ |
| Iron | | |
| 2 | 37 | 22½ |
| 2½—3½ | 38 | 25 |
| 4—8 | 40 | 28½ |

LINE PIPE

Steel

| | |
|---|---|
| ½, butt weld | 57½ |
| ⅛-inch, but weld | 50½ |
| ¼—⅜, buttweld | 52½ |
| ¾, butt weld | 61 |
| 1—3, butt weld | 63 |
| 2-inch, lap weld | 59 |
| 2½—3, lap weld | 62 |
| 3½—6, lap weld | 64 |
| 7—8, lap weld | 63 |

Iron

⅛—1½-inch, black and galv. take 4 pts., over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists. 8—12-inch, no extra.

BOILER TUBES

*C. L. Discounts, f.o.b. Pitts.*

| *Lap Weld Steel* | | *Charcoal Iron* | |
|---|---|---|---|
| 2—2¼ | 33 | 1¾ | 8 |
| 2½—2¾ | 40 | 2—2¼ | 13 |
| 3 | 47 | 2½—2¾ | 16 |
| 3¼—3½ | 50 | 3 | 17 |
| 4 | 52 | 3¾—3½ | 18 |
| 4½—5 | 42 | 4 | 20 |
| | | 4½ | 21 |

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 2000 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron; 10,000 pounds to carloads, base less 5%; under 10,000 pounds, two points under base only.

SEAMLESS BOILER TUBES

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

## Seamless Tubing □

*Cold drawn; f.o.b. mill disc.*

| | |
|---|---|
| 100 ft. or 150 lbs. | 32% |
| 15,000 ft. or 22,500 lbs. | 70% |

## Cast Iron Water Pipe □

*Class B Pipe—Per Net Ton*

| | |
|---|---|
| 6-in. & over, Birm. | $38.00-39.00 |
| 4-in., Birmingham | 41.00-42.00 |
| 4-in., Chicago | 49.00-50.00 |
| 6 to 24-in., Chicago | 46.00-47.00 |
| 3-in & over, east fdy | 42.00 |
| Do., 4-in. | 45.00 |

Class A pipe $2 over Class B.

| | |
|---|---|
| Stnd. fitgs., Birm. base | $100.00 |

## Semifinished Steel □

BILLETS AND BLOOMS

*4 x 4-inch base; gross ton*

| | |
|---|---|
| Pitts., Chi., Cleve., and Youngstown | $27.00 |
| Philadelphia | 32.30 |
| Duluth | 31.00 |
| Forging, Pitts., Chi. and Buffalo | 32.00 |
| Forging, Duluth | 36.00 |
| SHEET BARS | |
| Pitts., Cleve., Young., Chi., Buff., Canton, O., and Sparrows Point, Md., | 28.00 |
| SLABS | |
| Pitts., Cleve., Young. | 27.00 |
| WIRE RODS | |
| Pitts., Cleveland | 38.00 |
| Chicago | 39.00 |
| Worcester, Mass. | 40.00 |
| SKELP | |
| Pitts., Chicago | 1.70c |

## Coke □ □ □

*Price Per Net Ton*

BEEHIVE OVENS

| | |
|---|---|
| Connellsville, fur | $3.60- 3.85 |
| Connellsville, fdry. | 4.60 |
| Connell. prem. fdy. | 5.10 |
| New River fdry | 6.00 |
| Wise county fdry. | 4.45- 5.25 |
| Wise county fur. | 4.00- 4.50 |
| BY-PRODUCT FOUNDRY | |
| Newark, N. J., del. | 8.71- 9.31 |
| Chi., ov., outside del. | 8.50 |
| Chicago, del | 9.25 |
| New England, Del. | 10.50 |
| St. Louis, del. | 9.25 |
| Birmingham, ovens | 6.00 |
| Indianapolis, del. | 8.75 |
| Cincinnati, del. | 9.30 |
| Cleveland, del. | 9.25 |
| Buffalo, ovens | 7.50- 8.00 |
| Detroit, ovens | 8.50 |
| Philadelphia, del. | 9.00 |

## Coke By-Products □

Per gallon, producers' plants.

| Tank lots | Spot |
|---|---|
| Pure benzol | 19.00c |
| 90 per cent benzol | 19.00c |
| Toluol | 30.00c |
| Solvent naphtha | 26.00c |
| Commercial xylol | 26.00c |

Per lb. f.o.b. New York

| | |
|---|---|
| Phenol (200 lb drums) | 16.30c |
| Do. (100 lbs.) | 17.30c |

Eastern Plants, per lb.

| | |
|---|---|
| †Naphthalene flakes and balls, in bbl. | 6.00c |

Per 100 lb. Atlantic seaboard

| | |
|---|---|
| Sulphate of ammonia | $1.20 |

†Western prices ½-cent up

## Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25; 50-cent differentials apply to any grade below 1.75. Gross tons.

| BASING POINTS: | No. 2 Fdry. | Malleable | Basic | Bessemer |
|---|---|---|---|---|
| Bethlehem Pa. | $19.50 | $20.00 | $19.00 | $20.50 |
| Birdsboro, Pa. | 19.50 | 20.00 | 19.00 | 20.50 |
| Birmingham, Ala., southern del. | 14.50 | ..... | 13.50 | 19.00 |
| Buffalo | 18.50 | 19.00 | 17.50 | 19.50 |
| Chicago | 18.50 | 18.50 | 18.00 | 19.00 |
| Cleveland | 18.50 | 18.50 | 18.00 | 19.00 |
| Detroit | 18.50 | 18.50 | 18.00 | 19.00 |
| Duluth | 19.00 | 19.00 | ..... | 19.50 |
| Erie, Pa. | 18.50 | 19.00 | 18.00 | 19.50 |
| Everett, Mass. | 19.50 | 20.00 | 19.00 | 20.50 |
| Granite City, Ill. | 18.50 | 18.50 | 18.00 | ..... |
| Hamilton, O. | 18.50 | 18.50 | 18.00 | 19.00 |
| Jackson, O. | 20.25 | 20.25 | 19.75 | ..... |
| Neville Island, Pa. | 18.50 | 18.50 | 18.00 | 19.00 |
| Provo, Utah | 17.50 | ..... | 17.00 | ..... |
| Sharpsville, Pa. | 18.50 | 18.50 | 18.00 | 19.00 |
| Sparrows Point, Md. | 19.50 | ..... | 19.00 | ..... |
| Swedeland, Pa. | 19.50 | 20.00 | 19.00 | 20.50 |
| Toledo, O. | 18.50 | 18.50 | 18.00 | 19.00 |
| Youngstown, O. | 18.50 | 18.50 | 18.00 | 19.00 |
| DELIVERED FROM BASING POINTS: | | | | |
| Akron, O., from Cleveland | 19.76 | 19.76 | 19.26 | 20.26 |
| Baltimore from Birmingham | 20.02 | ..... | 19.90 | ..... |
| Boston from Birmingham | 19.62 | ..... | 19.50 | ..... |
| Boston from Everett, Mass. | 20.00 | 20.50 | 19.50 | 21.00 |
| Boston from Buffalo | 20.00 | 20.50 | 19.50 | 21.00 |
| Brooklyn, N. Y., from Bethlehem | 21.77 | 22.27 | ..... | ..... |
| Brooklyn, N. Y., from Bmghm. | 21.39 | ..... | ..... | ..... |
| Canton, O., from Cleveland | 19.76 | 19.76 | 19.26 | 20.26 |
| Chicago from Birmingham | †18.72 | ..... | 18.60 | ..... |
| Cincinnati from Hamilton, O. | 19.51 | 19.51 | 19.01 | ..... |
| Cincinnati from Birmingham | 19.13 | ..... | 19.01 | ..... |
| Cleveland from Birmingham | 18.62 | ..... | 18.50 | ..... |
| Indianapolis from Hamilton, O. | 20.77 | 20.77 | 20.27 | 21.27 |
| Mansfield, O., from Toledo, O. | 20.26 | 20.26 | 19.76 | 20.76 |
| Milwaukee from Chicago | 19.50 | 19.50 | 19.00 | 20.00 |
| Muskegon, Mich., from Chicago, Toledo or Detroit | 21.40 | 21.40 | 20.90 | 21.90 |
| Newark, N. J., from Birmingham | 20.51 | ..... | ..... | ..... |
| Newark, N. J., from Bethlehem | 20.89 | 21.39 | ..... | ..... |
| Philadelphia from Birmingham | 19.88 | ..... | 19.76 | ..... |
| Philadelphia from Swedeland, Pa. | 20.26 | 20.76 | 19.76 | ..... |
| Pittsburgh district from Neville Island | (Neville Island base, plus 63c, 76c and $1.13 switching chgs.) | | | |
| Saginaw, Mich., from Detroit | 20.60 | 20.60 | 20.10 | 21.10 |
| St. Louis from Granite City, Ill. | 19.00 | 19.00 | 18.50 | ..... |
| St. Louis from Birmingham | 18.62 | ..... | 18.50 | ..... |
| St. Paul from Duluth | 20.94 | 20.94 | ..... | 21.44 |

†Over 0.70 phos.

LOW PHOS.

Basing Points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.50. Basing Point: †Johnson City, Tenn.—$23.50

†Off grade material is $19.50

Philadelphia, standard and copper bearing ..... 24.63

| GRAY FORGE | | CHARCOAL | |
|---|---|---|---|
| *Valley furnace | 18.00 | Lake Superior fur. | 21.00 |
| *Pitts. dist. fur. | 18.00 | Do., del. Chicago | 24.04 |

SILVERY†

Jackson County, O., base; 6%—$22.75; 7—$23.75; 8—$24.75; 9—$25,70; 10—$26.75; 11—$27.75. Buffalo base prices $1.25 higher.

BESSEMER FERROSILICON†

Jackson County, O., base; 10%—$27.75; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25. Buffalo base prices $1.25 higher.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

## Iron Ore

LAKE SUPERIOR ORE

*Gross ton, 51½% Lower Lake Ports*

| | |
|---|---|
| Old range bessemer | $4.80 |
| Mesabi nonbess. | 4.50 |
| High phosphorus | 4.40 |
| Mesabi bessemer | 4.65 |
| Old range nonbess. | 4.65 |

EASTERN LOCAL ORES

*Cents, unit, del. E. Pa.*

| | |
|---|---|
| Foundry and basic 56-63% con. (nom.) | 8.00- 9.00 |
| Cop.-free low phos. 58-60% (nom.) | 10.00-10.50 |

FOREIGN ORE

*Cents per unit, f.a.s. Atlantic ports (nominal)*

| | |
|---|---|
| Foreign manganiferous ore, 45-55% iron, 6-10% man. | 10.00 |
| No. Afr. & low phos. | 9.50 |
| Swedish basic, 65% | 9.00 |
| Swedish low phos. | 9.50 |
| Spanish No. Africa basic, 50 to 60% | 9.00 |
| Tungsten, spot, sh. ton unit, duty pd. | $17.75-18.25 |
| N. F. fdy., 55% | 7.00 |
| Chrome ore, 48% gross ton, c.i.f. | $18.00 |

## Manganese Ore

*(Nominal)*

Prices, not including duty, cents per unit, cargo lots.

| | |
|---|---|
| Caucasian, 52-55% | 26.00 |
| So. African, 52% | 26.00 |
| So. Afr., 49-51% | 24.00 |
| Indian, 58-50% | nominal |
| Indian, 48-50% | nominal |

## Refractories

*Per 1000 f.o.b. Works*

FIRE CLAY BRICK

*First Quality*

| | |
|---|---|
| Pa., Ill., Ky., Md., Ga., Mo. | $45.00 |
| Alabama | 45.00 |

*Second Quality*

| | |
|---|---|
| Pa., Ill., Ky., Md., Mo., Ga., Ala. | 40.00 |

*Ohio*

| | |
|---|---|
| First quality | $40.00 |
| Intermediary | 36.00 |
| Second quality | 25.00 |
| MALLEABLE BUNG BRICK | |
| All bases | 50.00 |
| SILICA BRICK | |
| Pennsylvania | $45.00 |
| Joliet, E. Chicago | 54.00 |
| Birmingham, Ala. | 52.00 |
| MAGNESITE | |
| Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases | $45.00 |
| Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases | 40.00 |
| Domestic dead-burned grains, net ton f.o.b Chewelah, Wash. | 22.00 |
| BASIC BRICK | |
| *Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.* | |
| Magnesite brick | $65.00 |
| Chrome brick | 45.00 |
| Chemically bonded magnesite | 55.00 |

## Fluorspar, 85-5

| | |
|---|---|
| Washed gravel, duty paid, tide, net ton | $19.50 |
| Washed gravel, f.o.b. Ill., Key., net ton, carloads | $15.50-16.00 |

## Ferroalloys

*Dollars, except Ferrochrome*

| | |
|---|---|
| Ferromanganese, 78-82% tidewater, duty paid | 85.00 |
| Do., Balti. base | 85.00 |
| Do., del. Pittsburgh | 89.79 |
| Spiegeleisen, 19-20% dom. fur. spot† | 26.00 |
| Ferrosilicon 50%, freight all., cl. | 77.50 |
| Do., less carload | 85.00 |
| Do., 75 per cent. | 126-130.00 |

Spot, $5 a ton higher.

| | |
|---|---|
| Silicomang., 2½ carb. 2% carbon, 95.00; 1%, | 105.00 |
| Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del. | 10.00 |
| Ferrotungsten, stand., lb. cont. del. | 1.35- 1.45 |
| Ferrovanadium, 35 to 40% lb., cont., on analysis | 2.70- 2.90 |
| Ferrotitanium, c. l., prod. plant, frt. allow., net ton | 137.50 |
| Spot, 1 ton, frt. allow., lb. | 7.00 |
| Do., under 1 ton | 7.50 |
| Ferrophosphorus, per ton, c. l., 17-19%, Rockdale Tenn., basis, 18%, $2 unitage | 42.00 |
| Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage | 55.00 |
| Ferromolybdenum, stand. 50-60%, lb. | 0.95 |
| Molybdate, lb. cont. | 0.80 |

†Carloads, Quan. diff. apply.

## Nonferrous Mill Products

*F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 9.00c Conn. copper*

**Sheets**

| | |
|---|---|
| Yellow brass (high) | 14.50 |
| Copper, hot rolled | 16.00 |
| Lead, cut, to jobbers | 7.50 |
| Zinc, 100-lb. base | 9.50 |

**Tubes and Pipes**

| | |
|---|---|
| High yellow brass | 17.00 |
| Seamless copper | 17.25 |

**Rods**

| | |
|---|---|
| High yellow brass | 13.00 |
| Copper, hot rolled | 13.25 |

**Anodes**

| | |
|---|---|
| Copper untrimmed | 13.75 |

**Wire**

| | |
|---|---|
| Yellow brass (high) | 15.00 |

## Old Metals

*Deal, buying prices, cents lb.*

**No. 1 Composition Red Brass**

| | |
|---|---|
| New York | 4.00- 4.25 |
| Chicago | 4.00- 4.25 |
| Cleveland | 4.25- 4.50 |
| St. Louis | 4.00- 4.25 |

**Heavy Copper and Wire**

| | |
|---|---|
| New York | 5.00- 5.25 |
| Chicago, No. 1 | 5.25- 5.50 |
| Cleveland | 5.00- 5.25 |
| St. Louis | 4.75- 5.00 |

**Composition Brass Borings**

| | |
|---|---|
| New York | 3.75- 4.00 |

**Light Copper**

| | |
|---|---|
| New York | 4.00- 4.37½ |
| Chicago | 3.87½-4.12½ |
| Cleveland | 4.25- 4.50 |
| St. Louis | 4.00- 4.25 |

**Light Brass**

| | |
|---|---|
| Chicago | 1.87½-2.12½ |
| Cleveland | 2.25- 2.50 |

**Lead**

| | |
|---|---|
| *New York | 2.75- 3.00 |
| *Cleveland | 2.75- 2.90 |
| Chicago | 2.62½-2.87½ |
| St. Louis | 2.60- 2.75 |

**Zinc**

| | |
|---|---|
| New York | 1.75- 2.00 |
| Cleveland | 1.75- 1.85 |
| St. Louis | 2.50- 2.60 |

**Aluminum**

| | |
|---|---|
| Borings, Cleveland | 6.00- 7.00 |
| Mixed, cast, Cleve. | 10.25-11.00 |
| Mixed, cast, St. L. | 9.25-10.25 |
| Clips, soft, Cleve. | 12.00-13.00 |

## Secondary Metals

| | |
|---|---|
| Brass ingot, 85-5-5-5 | 8.25 |
| Stand. No. 12 Alum. | 14.00 |

# Iron and Steel Scrap Prices

*Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated*

**HEAVY MELTING STEEL**

| | |
|---|---|
| Birmingham | 8.00- 8.50 |
| Boston, dealers | 5.00- 5.25 |
| Buffalo, No. 1 | 9.50-10.00 |
| Buffalo, No. 2 | 8.50- 9.00 |
| Chicago, No. 1 | 8.50- 9.00 |
| Cleveland, No. 1 | 8.00- 8.50 |
| Cleveland, No. 2 | 7.50- 8.00 |
| Detroit, No. 1 | 7.50- 8.00 |
| Detroit, No. 2 | 6.50- 7.00 |
| Eastern Pa. | 9.50- 9.75 |
| Eastern Pa., No. 2 | 8.00- 8.50 |
| Federal, Ill. | 7.00- 7.50 |
| Granite City, R. R. | 7.00- 7.50 |
| Granite City, No. 2 | 6.25- 6.75 |
| N. Y., deal. R. R. | 8.00 |
| N. Y., deal. No. 2 | 6.50 |
| Pittsburgh, No. 1 | 10.00-10.50 |
| St. Louis | 6.50- 7.00 |
| Valleys, No. 1 | 10.50 |

**COMPRESSED SHEETS**

| | |
|---|---|
| Buffalo, dealers | 8.50- 9.00 |
| Chicago, factory | 7.75- 8.25 |
| Cleveland | 7.00- 7.50 |
| Detroit | 7.50- 8.00 |
| E. Pa., new mat. | 9.00- 9.50 |
| Pittsburgh | 10.25-10.75 |
| St. Louis | 5.00- 5.50 |
| Valleys | 10.00 |

**BUNDLED SHEETS**

| | |
|---|---|
| Buffalo | 6.50- 7.00 |
| Cincinnati, del. | 6.00- 6.50 |
| Cleveland | 6.50- 7.00 |
| Pittsburgh | 8.25- 8.75 |
| St. Louis | 4.00- 4.25 |

**SHEET CLIPPINGS, LOOSE**

| | |
|---|---|
| Chicago | 4.00- 4.50 |
| Cincinnati | 4.50- 5.00 |
| Detroit | 4.50- 5.00 |
| St. Louis | 3.50- 4.00 |

**STEEL RAILS, SHORT**

| | |
|---|---|
| Birmingham | 10.00-10.50 |
| Buffalo | 11.50-12.00 |
| Chicago (3 ft.) | 9.50-10.00 |
| Chicago (2 ft.) | 11.00-11.50 |
| Cincinnati, del. | 9.75-10.25 |
| Detroit | 10.00-10.50 |
| Pitts., open-hearth, 3 ft. and less | 13.00-13.50 |
| St. Louis, 2 ft. & less | 10.00-10.50 |

**STEEL RAILS, SCRAP**

| | |
|---|---|
| Boston | 5.00- 5.25 |
| Chicago | 8.50- 9.00 |
| Pittsburgh | 10.00-10.50 |

**STOVE PLATE**

| | |
|---|---|
| Birmingham | 5.50- 6.00 |
| Boston, dealers | 3.25- 3.75 |
| Buffalo | 8.50- 9.00 |
| Chicago, net | 5.50- 6.00 |
| Cincinnati, dealers | 5.00- 5.50 |
| Detroit, net | 6.00- 6.50 |
| Eastern Pa. | 8.50 |
| N. Y., deal. fdry. | 6.00 |
| St. Louis | 5.00- 5.50 |

**COUPLERS, SPRINGS**

| | |
|---|---|
| Buffalo | 12.00-12.50 |
| Chicago, springs | 9.50-10.00 |
| Eastern Pa. | 12.50-13.00 |
| Pittsburgh | 13.50-14.00 |
| St. Louis | 8.50- 9.00 |

**ANGLE BARS—STEEL**

| | |
|---|---|
| Chicago | 9.00- 9.50 |
| St. Louis | 7.50- 8.00 |

**RAILROAD SPECIALTIES**

| | |
|---|---|
| Chicago | 9.50-10.00 |

**LOW PHOSPHORUS**

| | |
|---|---|
| Buffalo, billets and bloom crops | 11.50-12.00 |
| Cleveland, billet, bloom crops | 13.00-13.50 |
| Eastern Pa., crops | 13.50-14.00 |
| Pittsburgh, billet, bloom crops | 13.50-14.00 |
| Pittsburgh, sheet bar crops | 13.00-13.50 |

**FROGS, SWITCHES**

| | |
|---|---|
| Chicago | 8.50- 9.00 |
| St. Louis, cut | 8.50- 9.00 |

**SHOVELING STEEL**

| | |
|---|---|
| Chicago | 8.50- 9.00 |
| Federal, Ill. | 6.75- 7.00 |
| Granite City, Ill. | 6.25- 6.75 |

**RAILROAD WROUGHT**

| | |
|---|---|
| Birmingham | 7.00- 7.50 |
| Boston, dealers | 6.00- 6.50 |
| Buffalo, No. 1 | 7.50- 8.00 |
| Buffalo, No. 2 | 9.50-10.00 |
| Chicago, No. 1, net | 7.00- 7.50 |
| Chicago, No. 2 | 8.50- 9.00 |
| Cincinnati, No. 2 | 7.00- 7.50 |
| Eastern Pa. | 10.50 |
| N. Y., No. 1, deal. | 7.00- 7.50 |
| St. Louis, No. 1 | 5.75- 6.25 |
| St. Louis, No. 2 | 6.75- 7.25 |

**SPECIFICATION PIPE**

| | |
|---|---|
| Boston | 3.00- 3.25 |
| Eastern Pa. | 8.00 |
| New York, dealers | 3.50- 3.75 |

**BUSHELING**

| | |
|---|---|
| Buffalo, No. 1 | 8.50- 9.00 |
| Chicago, No. 1 | 7.00- 7.50 |
| Cinci., No. 1, deal. | 5.50- 6.00 |
| Cincinnati, No. 2 | 3.50- 4.00 |
| Cleveland, No. 2 | 6.50- 7.00 |
| Detroit, No. 1, new | 6.50- 7.00 |
| Valleys, new No. 1 | 9.75 |

**MACHINE TURNINGS**

| | |
|---|---|
| Birmingham | 4.50- 5.00 |
| Boston, dealers | 1.25 |
| Buffalo | 4.75- 5.25 |
| Chicago | 4.50- 5.00 |
| Cincinnati, dealers | 4.00- 4.50 |
| Cleveland | 6.00- 6.50 |
| Detroit | 4.50- 5.00 |
| Eastern Pa. | 5.00- 5.50 |
| New York, dealers | 1.75- 2.00 |
| Pittsburgh | 7.00- 7.50 |
| St. Louis | 3.00- 3.50 |
| Valleys | 8.00- 8.25 |

**BORINGS AND TURNINGS**

*For Blast Furnace Use*

| | |
|---|---|
| Boston, dealers | 3.25- 3.50 |
| Buffalo | 5.50- 6.00 |
| Cincinnati, dealers | 4.00- 4.50 |
| Cleveland | 6.50- 7.00 |
| Detroit | 5.50- 6.00 |
| Eastern Pa. | 5.00 |
| New York, dealers | 1.50- 1.75 |
| Pittsburgh | 5.50- 6.00 |

**CAST IRON BORINGS**

| | |
|---|---|
| Birmingham, plain | 4.50- 5.00 |
| Boston, chemical | 8.50- 9.00 |
| Boston, dealers | 3.25- 3.50 |
| Buffalo | 5.50- 6.00 |
| Chicago | 5.00- 5.50 |
| Cincinnati, dealers | 4.00- 4.50 |
| Cleveland | 6.75- 7.25 |
| Detroit | 5.50- 6.00 |
| E. Pa., chemical | 12.00-13.00 |
| New York, dealers | 1.50- 1.75 |
| Pittsburgh | 5.50- 6.00 |
| St. Louis | 3.00- 3.50 |

**PIPE AND FLUES**

| | |
|---|---|
| Cincinnati, dealers | 4.00- 4.50 |

**RAILROAD GRATE BARS**

| | |
|---|---|
| Buffalo | 6.50- 7.00 |
| Chicago, net | 5.50- 6.00 |
| Cincinnati | 4.00- 4.50 |
| Eastern Pa. | 8.00 |
| New York, dealers | 4.00- 4.50 |
| St. Louis | 4.00- 4.50 |

**FORGE FLASHINGS**

| | |
|---|---|
| Boston, dealers | 3.75 |
| Buffalo | 8.50- 9.00 |
| Cleveland | 7.00- 7.50 |
| Detroit | 6.00- 6.50 |

**FORGE SCRAP**

| | |
|---|---|
| Boston, dealers | 3.75 |
| Chicago, heavy | 9.50-10.00 |
| Eastern Pa. | 9.00 |

**ARCH BARS, TRANSOMS**

| | |
|---|---|
| St. Louis | 10.00-10.50 |

**AXLE TURNINGS**

| | |
|---|---|
| Boston, dealers | 4.00- 4.50 |
| Buffalo | 7.00- 7.50 |
| Chicago, elec. fur. | 7.50- 8.00 |
| Cleveland | 6.00- 6.50 |
| Eastern Pa. | 9.00 |
| St. Louis | 6.00- 6.25 |

**STEEL CAR AXLES**

| | |
|---|---|
| Birmingham | 10.00-10.50 |
| Boston, ship, point. | 9.50-10.00 |
| Buffalo | 12.00-12.50 |
| Chicago, net | 10.00-10.50 |
| Eastern Pa. | 14.00-15.00 |
| St. Louis | 10.00-10.50 |

**SHAFTING**

| | |
|---|---|
| Boston, ship, point. | 10.50-11.00 |
| Eastern Pa. | 15.00-15.50 |
| New York, dealers | 10.75-11.25 |
| St. Louis | 11.00-11.50 |

**CAR WHEELS**

| | |
|---|---|
| Birmingham, iron | 9.00- 9.50 |
| Boston, iron deal. | 5.00- 5.50 |
| Buffalo, iron | 11.00-11.50 |
| Buffalo, steel | 12.00-12.50 |
| Chicago, iron | 9.50-10.00 |
| Chicago, rolled steel | 9.50-10.00 |
| Cincinnati, iron | 7.50- 8.00 |
| Eastern Pa., iron | 11.00-11.50 |
| Eastern Pa., steel | 12.50-13.00 |
| Pittsburgh, iron | 10.00-10.50 |
| Pittsburgh, steel | 13.50-14.00 |
| St. Louis, iron | 7.25- 7.75 |
| St. Louis, steel | 8.75- 9.25 |

**NO. 1 CAST SCRAP**

| | |
|---|---|
| Birmingham | 8.50- 9.00 |
| Boston, No. 2 | 6.00 |
| Boston, tex. con. | 8.50- 9.00 |
| Buffalo, cupola | 9.50-10.00 |
| Buffalo, mach. | 10.50-11.00 |
| Chicago, agri. net | 7.50- 8.00 |
| Chicago, mach. net | 8.50- 9.00 |
| Chicago railroad net | 8.00- 8.50 |
| Cinci., mach. cup | 8.50- 9.00 |
| Cleveland, cupola | 10.75-11.25 |
| Detroit, net | 8.50- 9.00 |
| Eastern Pa., cupola | 11.00 |
| Pittsburgh, cupola | 12.00-12.50 |
| San Francisco, del. | 13.50-14.00 |
| Seattle | 7.00- 8.50 |
| St. Louis, No. 1 | 6.50- 7.00 |
| St. L., No. 1 mach. | 8.50- 9.00 |

**HEAVY CAST**

| | |
|---|---|
| Boston, del. | 4.50- 4.75 |
| Buffalo, break. | 7.75- 8.25 |
| Cleveland, break. | 7.50- 8.00 |
| Detroit, break. | 6.50- 7.00 |
| Detroit, auto net | 9.00- 9.50 |
| Eastern Pa. | 9.50-10.00 |
| N. Y., break. deal. | 5.00- 5.50 |
| Pittsburgh | 10.00-10.50 |

**MALLEABLE**

| | |
|---|---|
| Boston, consum. | 10.00-10.50 |
| Buffalo | 10.50-11.00 |
| Chicago, R. R. | 9.00- 9.50 |
| Cincinnati, agri. del. | 7.50- 8.00 |
| Cleveland, rail | 10.75-11.25 |
| Detroit, auto | 8.50- 9.00 |
| St. Louis, R. R. | 7.00- 7.50 |
| Eastern Pa., R. R. | 11.50-12.00 |

**RAILS FOR ROLLING**

*5 feet and over*

| | |
|---|---|
| Birmingham | 9.50-10.00 |
| Boston, dealers | 8.00- 8.50 |
| Buffalo | 10.25-10.75 |
| Chicago | 9.50-10.00 |
| Eastern Pa. | 12.00-12.50 |
| New York, dealer | 7.50- 8.00 |
| St. Louis | 9.00- 9.50 |

**LOCOMOTIVE TIRES**

| | |
|---|---|
| Chicago (cut) | 9.00- 9.50 |
| St. Louis, No. 1 | 9.50-10.00 |

**LOW PHOS. PUNCHINGS**

| | |
|---|---|
| Buffalo | 12.00-12.50 |
| Chicago | 9.50-10.00 |
| Eastern Pa. | 14.50-15.00 |
| Pittsburgh | 12.00-12.50 |

# Nonferrous Metal Prices of the Week

*Spot unless otherwise specified. Cents per pound*

| | Copper: Electro., del. Conn. | Copper: Lake, del. Midwest | Copper: Casting, refinery | Straits Tin: New York Spot | Straits Tin: New York Futures | Lead: N. Y. | Lead: East St. L. | Zinc: St. L. | Aluminum 98-99% | Antimony Spot, N. Y. | Nickel Cathodes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 13 | 9.00 | 9.12½ | 7.37½ | 50.95 | 50.97½ | 3.60 | 3.45 | 3.80 | *22.90 | 9.25 | 35.00 |
| Oct. 15 | 9.00 | 9.12½ | 7.37½ | 50.70 | 50.72½ | 3.60 | 3.45 | 3.80 | *22.90 | 10.00 | 35.00 |
| Oct. 16 | 9.00 | 9.12½ | 7.37½ | 50.95 | 50.97½ | 3.60 | 3.45 | 3.80 | *22.90 | 9.75 | 35.00 |
| Oct. 17 | 9.00 | 9.12½ | 7.37½ | 50.85 | 50.90 | 3.65 | 3.50 | 3.80 | *22.90 | 9.62½ | 35.00 |
| Oct. 18 | 9.00 | 9.12½ | 7.37½ | 50.90 | 50.92½ | 3.70 | 3.55 | 3.80 | *22.90 | 9.62½ | 35.00 |
| Oct. 19 | 9.00 | 9.12½ | 7.37½ | 51.00 | 51.05 | 3.70 | 3.55 | 3.80 | *22.90 | 9.50 | 35.00 |

*Nominal range 19.00c to 22.90c.

# Warehouse Iron and Steel Prices

*Cents per pound for delivery within metropolitan districts of cities specified*

| STEEL BARS | |
|---|---|
| Baltimore* | 2.90c |
| Boston†† | 2.95c |
| Buffalo | 3.00c |
| Chattanooga | 3.31c |
| Chicago | 2.95c |
| Cincinnati | 3.15c |
| Cleveland | 2.95c |
| Detroit | 3.03½c |
| Houston | 3.00c |
| Los Angeles | 3.70c |
| New Orleans | 3.30c |
| New York‡(d) | 3.22c |
| Pittsburgh(h) | 2.90c |
| Philadelphia* | 2.90c |
| San Francisco | 3.60c |
| Seattle | 3.60c |
| St. Louis | 3.19c |
| St. Paul | 3.00c |
| Tulsa | 3.25c |

| IRON BARS | |
|---|---|
| Portland | 3.40c |
| Chattanooga | 3.31c |
| Baltimore* | 3.00c |
| Chicago | 2.75c |
| Cincinnati | 3.15c |
| New York‡(d) | 3.32c |
| Philadelphia* | 2.90c |
| St. Louis | 3.19c |
| Tulsa | 3.25c |

| REINFORC. BARS | |
|---|---|
| Buffalo | 2.60c |
| Chattanooga | 3.31c |
| Chicago | 2.10c-2.60c |
| Cleveland (c) | 1.97½c |
| Cincinnati | 3.25c |
| Houston | 3.25c |
| Los Ang., cl | 2.15c |
| New Orleans | 3.50c |
| Pitts., plain(h) | 3.05c |
| Pitts., twisted squares (h) | 3.175c |
| San Francisco | 2.45c |
| Seattle | 3.50c |
| St. Louis | 3.24c |
| Tulsa | 3.25c |
| Young. | 2.30c-2.60c |

| SHAPES | |
|---|---|
| Baltimore* | 3.90c |
| Boston†† | 3.17c |
| Buffalo | 3.25c |
| Chattanooga | 3.56c |
| Chicago | 3.20c |
| Cincinnati | 3.40c |
| Cleveland | 3.31c |
| Detroit | 3.40c |
| Houston | 3.00c |
| Los Angeles | 3.70c |
| New Orleans | 3.55c |
| New York(d) | 3.37c |
| Philadelphia* | 2.95c |
| Pittsburgh(h) | 3.15c |
| Portland | 3.55c |
| San Francisco | 3.55c |
| Seattle | 3.55c |
| St. Louis | 3.44c |
| St. Paul | 3.25c |
| Tulsa | 3.50c |

| PLATES | |
|---|---|
| Baltimore* | 2.90c |
| Boston†† | 3.18c |
| Buffalo | 3.37c |
| Chattanooga | 3.56c |
| Chicago | 3.20c |
| Cincinnati | 3.40c |
| Cleveland, ¼-in. and over | 3.31c |
| Detroit | 3.40c |
| Detroit, ⅜-in. | 3.65c |
| Houston | 3.00c |
| Los Angeles | 3.70c |
| New Orleans | 3.55c |
| New York(d) | 3.40c |
| Philadelphia* | 2.95c |
| Phila. floor | 4.95c |
| Pittsburgh(h) | 3.15c |
| Portland | 3.55c |
| San Francisco | 3.55c |
| Seattle | 3.55c |
| St. Louis | 3.44c |
| St. Paul | 3.25c |
| Tulsa | 3.50c |

| NO. 10 BLUE | |
|---|---|
| Baltimore* | 3.05c |
| Boston†† | 3.25c |
| Buffalo | 3.62c |
| Chattanooga | 3.36c |
| Chicago | 3.00c |
| Cincinnati | 3.20c |
| Cleveland | 3.11c |
| Det., 8-10 ga. | 3.13½c |
| Houston | 3.35c |
| Los Angeles | 3.80c |
| New Orleans | 3.55c |
| New York | 3.27c |
| Portland | 3.75c |
| Philadelphia* | 3.05c |
| Pittsburgh(h) | 2.95c |
| San Francisco | 3.75c |
| Seattle | 3.75c |
| St. Louis | 3.29c |
| St. Paul | 3.45c |
| Tulsa | 3.70c |

| NO. 24 BLACK | |
|---|---|
| Baltimore*† | 3.51c |
| Boston (g) | 3.90c |
| Buffalo | 3.25c |
| Chattanooga | 4.21c |
| Chicago | 3.85c |
| Cincinnati | 4.05c |
| Cleveland | 3.91c |
| Detroit | 3.93½c |
| Los Angeles | 4.45c |
| New York | 3.85c |
| Philadelphia*† | 3.55c |
| Pitts.** (h) | 3.55c |
| Portland | 4.40c |
| San Francisco | 4.40c |
| Seattle | 4.40c |
| St. Louis | 4.09c |
| St. Paul | 3.695c |
| Tulsa | 4.75c |

| NO. 24 GAL. SHEETS | |
|---|---|
| Baltimore *† | 4.21c |
| Buffalo | 4.00c |
| Boston (g) | 4.60c |
| Chattanooga | 4.86c |
| Chicago (h) | 4.55c |
| Cincinnati | 4.70c |
| Cleveland | 4.61c |
| Detroit | 4.70c |
| Houston | 4.40c |
| Los Angeles | 5.05c |
| New Orleans | 4.95c |
| New York | 4.50c |
| Philadelphia*† | 4.25c |
| Pitts.** (h) | 4.15-4.45c |
| Portland | 5.00c |
| San Francisco | 5.00c |
| Seattle | 5.00c |
| St. Louis | 4.79c |
| St. Paul | 4.19c |
| Tulsa | 5.10c |

| BANDS | |
|---|---|
| Baltimore* | 3.15c |
| Boston†† | 3.25c |
| Buffalo | 3.42c |
| Chattanooga | 3.61c |
| Chicago | 3.30c |
| Cincinnati | 3.45c |
| Cleveland | 3.36c |
| Detroit, ⅜-in. and lighter | 3.38½c |
| Houston | 3.25c |
| Los Angeles | 3.90c |
| New Orleans | 3.95c |
| New York(d) | 3.62c |
| Philadelphia | 3.15c |
| Pittsburgh(h) | 3.20c |
| Portland | 3.90c |
| San Francisco | 4.05c |
| Seattle | 3.90c |
| St. Louis | 3.54c |
| St. Paul | 3.20c |
| Tulsa | 3.45c |

| HOOPS | |
|---|---|
| Baltimore | 2.80c |
| Boston | 4.25c |
| Buffalo | 3.42c |
| Chicago | 3.30c |
| Cincinnati | 3.45c |
| Det., No. 14 and lighter | 3.38½c |
| New York | 3.62c |
| Philadelphia | 3.40c |
| Pittsburgh(h) | 3.20c |
| Seattle | 5.60c |
| St. Louis | 3.54c |
| St. Paul | 3.75c |

| COLD FIN. STEEL | |
|---|---|
| Baltimore(c) | 3.71c |
| Boston | 4.00c-4.50c |
| Buffalo (h) | 3.55c |
| Chattanooga* | 4.06c |
| Chicago (h) | 3.50c |
| Cincinnati | 3.70c |
| Cleveland(h) | 3.50c |
| Detroit | 3.63½c |
| Los Ang.(f)(d) | 4.95c |
| New Orleans | 4.30c |
| New York | 3.92c-4.42c |
| Philadelphia | 3.73c |
| Pittsburgh(h) | 3.45c |
| Portland (f) | 4.75c |
| San Fran.(f)(d) | 5.95c |
| Seattle(f)(d) | 4.75c |
| St. Paul | 3.20c |
| St. Louis | 3.74c |
| Tulsa | 4.65c |

| COLD ROLL. STRIP | |
|---|---|
| Boston, 0.100-in., 500 lb. lots | 5.35c |
| Buffalo | 3.39c |
| Chicago | 3.27c |
| Cincinnati(b) | 3.42c |
| Cleveland (b) | 3.20c |
| Detroit | 3.33c |
| New York | 4.70c |
| St. Louis | 3.36c |

(b) Plus straightening, cutting and quantoty differentials.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) 50 bundles or over.
(h) Outside delivery, 10c less.

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.
†New extras apply.
††Base 40,000 lbs. extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

# Current Iron and Steel Prices of Europe

**Dollars at Rates of Exchange, Oct. 18**

## Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

| PIG IRON | £ s d | British gross tons U. K. ports | Continental Channel or North Sea ports, metric tons Quoted in dollars at current value | **Quoted in gold pounds sterling £ s d |
|---|---|---|---|---|
| Foundry, 2.50-3.00 Silicon | $14.85 | 3 0 0 | $13.41 | 1 13 0 |
| Basic bessemer | 13.37 | 2 14 0* | 12.59 | 1 11 0 |
| Hematite, Phos. .03-.05 | 14.97 | 3 0 6 | ..... | ..... |
| **SEMIFINISHED STEEL** | | | | |
| Billets | $27.23 | 5 10 0 | $19.10 | 2 7 0 |
| Wire rods, No. 5 gage | 38.61 | 7 16 0 | 27.57 | 4 10 0 |
| **FINISHED STEEL** | | | | |
| Standard rails | $38.36 | 7 15 0 | $44.71 | 5 10 0 |
| Merchant bars | 1.66c | 7 10 0 | 1.10c | 3 0 0 |
| Structural shapes | 1.63c | 7 7 6 | 1.14c | 3 1 6 |
| Plates, †¼ in. or 5 mm | 1.77c | 8 0 0 | 1.52c | 4 2 6 |
| Sheets, black, 24 gage or 0.5 mm | 2.04c | 9 5 0 | 1.95c | 5 5 0 |
| Sheets, gal., 24 gage, corr. | 2.49c | 11 5 0 | 2.39c | 6 10 0 |
| Bands and strips | 1.82c | 8 5 0 | 1.47c | 4 0 0 |
| Plain wire, base | 2.04c | 9 5 0 | 1.99c | 5 7 6 |
| Galvanized wire, base | 2.49c | 11 5 0 | 2.30c to 2.33c | 6 5 6 to 6 7 6 |
| Wire nails, base | 2.65c | 12 0 0 | 2.12c | 5 15 0 |
| Tin plate, box 108 lbs. | $ 4.46 | 0 18 2 | ..... | ..... |

British ferromanganese $85 delivered Atlantic seaboard, duty paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

## Domestic Prices at Works or Furnace—Last Reported

| | £ s d | | French Francs | | Belgian Francs | | Reich Marks |
|---|---|---|---|---|---|---|---|
| Fdy. pig iron, Si. 2.5 | $16.71 | 3 7 6(a) | $13.47 | 210 | $14.60 | 310 | $25.59 | 63 |
| Basic bessemer pig iron | 16.71 | 3 7 6(a)* | 12.30 | 185 | 13.42 | 285 | 28.23 | (b)69.50 |
| Furnace coke | 4.33 | 0 17 6 | 7.98 | 120 | 5.18 | 110 | 7.72 | 19 |
| Billets | 27.23 | 5 10 0 | 28.60 | 430 | 20.72 | 440 | 39.20 | 96.50 |
| Standard rails | 1.82c | 8 5 0 | 2.10c | 700 | 2.31c | 1,100 | 2.43c | 132 |
| Merchant bars | 1.90c | 8 12 0 | 1.68c | 560 | 1.16c | 550 | 2.02c | 110 |
| Structural shapes | 1.93c | 8 15 0 | 1.65c | 550 | 1.16c | 550 | 1.98c | 107.50 |
| Plates, †¼-in. or 5 mm | 1.86c | 8 8 9 | 2.10c | 700 | 1.47c | 700 | 2.34c | 127 |
| Sheets, black | 2.32c | 10 10 0§ | 2.55c | 850‡ | 1.63c | 775‡ | 2.65c | 144‡ |
| Sheets, galv., corr., 24 ga. or 0.5 mm | 2.87c | 13 0 0 | 4.50c | 1,500 | 3.15c | 1,500 | 6.81c | 370 |
| Plain wire | 2.04c | 9 5 0 | 3.39c | 1,130 | 2.31c | 1,100 | 3.18c | 173 |
| Bands and strips | 2.07c | 9 7 0 | 1.95c | 650 | 1.47c | 700 | 2.34c | 127 |

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b Since January.
**Gold pound sterling carries a premium of 67.647 per cent over paper sterling.

# Bars

Bar Prices, Page 58

**Pittsburgh** — With dissipation of rumors of lower bar prices last week, buying began to open up. This improvement was shared by both carbon and alloy grades, and a noticeable improvement has set in from agricultural implement makers, who are now making up orders for export. At 1.80c, Pittsburgh, and 2.45c on hot-rolled alloy bars, the market promises to be quoted unchanged for the balance of this quarter.

**Cleveland**—Although the price situation has been strengthened by the government's decision not to interfere with the steel industry's code or pricing policies, purchasing here last week was not measurably improved over the preceding week. Such slight gains as were noted in specifications from automobile forging shops, steam shovel and agricultural implement manufacturers were insufficient to lift operations at the Cleveland bar mills over a rate of 25 per cent. Most orders booked by sellers here were under 100 tons, many 5 to 25 tons.

**Chicago**—Steel bar sales and specifications show no improvement, with demand at about the rate of the preceding several weeks. While consumption by farm implement manufacturers has gained recently, bar demand from this source has shown little change. Some farm equipment interests have been fairly well protected by stocks. Automotive needs are tending upward but the improvement is slow. Buyers of steel decline to purchase beyond early needs.

**Boston**—Demand for commercial, alloy and forging bars continues sluggish. Commercial bars are 2.20c, Boston.

**New York**—With railroads and bolt and nut manufacturers still specifying lightly, movement of commercial steel bars in this district is showing an appreciable improvement. Meanwhile, the market is unchanged at 1.85c, Pittsburgh, or 2.18c, New York.

Among new prices on bars filed with the American Iron and Steel institute are: Hot-rolled bars of internal combustion valve steel 142, 35 cents per pound; tungsten alloy spring steel hot-rolled bars, $10.25 per 100 pounds, both effective Oct. 23; soft center plow steel bars, 5¼ cents per pound, effective Oct. 25; all base, Pittsburgh. The latter item represents a reduction of $5 a ton.

**Philadelphia** — Commercial steel bars are moving in slightly better volume, although orders generally are small, for spot delivery. The market is 1.85c, Pittsburgh, or 2.14c, Philadelphia. Common iron bars are moving slowly at 1.99c, Philadelphia.

# Plates

Plate Prices, Page 58

**Pittsburgh**—Some barge builders in this district expect to enter bids before the Oct. 22 closing date at the Jacksonville, Fla., army engineers' offices on two 60-foot barges and two or four 75-foot steel barges. Bids were opened last week by Pittsburgh federal engineers for 27 tons of plates for repair parts to Ohio river locks. The river barge market is disappointing, with practically no promising inquiries. The plate market is steady at 1.80c, Pittsburgh.

**Cleveland**—Engineers are figuring on considerable oil refinery work, including a $350,000 cracking plant and other improvements at Sarnia, Ont, for the National Refining Co. of Canada, which will require a substantial tonnage of plates and shapes. Manufacturers of miscellaneous types of small tanks appear to be more active and placed some fairly good orders. Railroad specifications are light.

**Chicago**—Plate demand continues slow, almost entirely of small individual lots. Little assistance to buying is looked for from railroads during this quarter with the long-term outlook uncertain. A few miscellaneous tank orders are being received, all of them taking small lots. Two tanks for the Michigan City, Ind., filtration plant involve 260 tons of plates.

**Boston**—Plate demand is generally unchanged and light. Buying is mainly in small, miscellaneous lots, this including larger consumers, who are taking only immediate requirements. Boiler shops and tank fabricators, as a rule, have little volume booked ahead. Bids to have opened Oct. 12 on several hundred tons of plates for delivery to the navy yard, Boston, were postponed to Nov. 2.

**Philadelphia**—Miscellaneous plate demand is expanding somewhat, although lack of railroad tonnage and tank work is restricting total specifications. The market is 1.90c, Coatesville, Pa., or 1.98c, Philadelphia.

**New York**—Plate demand is improving moderately, although there is still a dearth of railroad tonnage and delay in placing some oil company business which has been pending, at least insofar as domestic producers are concerned. The Standard Oil Co. of New Jersey has placed 12,000 tons of steel for its refinery in Argentina, but this business went to German fabricators, the oil company in this way obtaining in effect a release of marks held on the other side, it is said.

A shipyard in this district has awarded 600 tons of plates and shapes to a mill in the Pittsburgh district.

**Birmingham, Ala.**—Plate fabricators report demand slow. The freight car building program here will be completed shortly, the plant of the Pullman Car & Mfg. Corp. at Bessemer, Ala., having been turning out box, phosphate and hopper cars for the Central of Georgia and Seaboard Air Line during the past several weeks.

## Contracts Placed

1030 tons, tanks, General American Tank & Terminal Co., Corpus Christi, Tex., to Wyatt Metal & Boiler Works, Dallas, Tex.

260 tons, two tanks, filtration plant, Michigan City, Ind., to Chicago Bridge & Iron Works, Chicago.

120 tons, 250,000-gallon tank and tower, Brawley, Calif., to Chicago Bridge & Iron Works, Chicago.

Unstated tonnage, tanks, City hospital, Baltimore, to Chicago Bridge & Iron Works, Chicago, $14,800.

## Contracts Pending

5800 tons, aqueduct, Los Angeles; Western Pipe & Steel Co., Los Angeles, low.

1632 tons, plates and sheets, navy yards at Mare Island, Calif., and Bremerton, Wash.; bids opened.

1500 tons, storage tanks, Richmond, Calif., for Standard Oil Co., San Francisco; project suspended indefinitely.

147 tons, bureau of supplies and accounts, navy department, Washington, for delivery to east and west yards, Oct. 26, schedule 3486.

Unstated tonnage, 250,000-gallon elevated steel water tank, Shawano, Wis.; bids Oct. 22.

Unstated tonnage, two 60-foot and two or four 75-foot steel deck barges, United States engineer, Jacksonville, Fla.; bids Oct. 22.

# Sheets

Sheet Prices, Page 58

**Pittsburgh** — Agricultural implement makers have placed some fair size orders for sheets, but demand for full finished grades is slow, and buying of black and galvanized sheets is spotty. A district mill has received several sizable orders for 1935 automobile bodies, and was able last week to advance its rolling operations sharply. The average of operations in the sheet-producing industry was little changed last week,

around 20-22 per cent. At Pittsburgh, black sheets are quoted 2.40c; hot rolled 1.85c; galvanized 3.10c; No. 10 gage cold rolled 2.50c; and No. 20 gage cold rolled 2.95c.

**Cleveland**—Sheet orders from the automobile industry still are restricted to small lots. Specifications from other consumers, principally manufacturers of household equipment, received by some leading producers represent a larger tonnage than that from automobile interests. Sheet mills in an adjacent lake district serving the Michigan automobile trade have been idle since the first week in October, and no schedules are in view for this week. In Cleveland sheet mill operations are intermittent, averaging around 20 per cent. The most encouraging feature in the market is the release of orders for parts and accessories from some automobile companies, which is expected to result in more sheet specifications shortly.

**Chicago**—While sheet demand has improved only moderately, expectations are for an acceleration of the upturn upon resumption of more active operations in the automotive industry. Orders from this group have been responsible for a large portion of gains noted in total bookings recently, although tonnages still are relatively light.

**Boston**—Specifications are barely holding to the recent rate, few orders calling for full carloads. Small tank and container requirements are below the rate of the last two years at this period.

**New York**—Seasonal demand for heavy gage hot rolled sheets for oil burner tanks features the market. Little improvment in tonnage is noted.

**Philadelphia**—The trend in sheet buying is upward. Improvement is of a miscellaneous character, with no one class of consumers especially active. Much of the autobody tonnage discussed in the trade in recent weeks is yet to be translated into actual business, and in a lesser degree this is true of radio tonnage. The Gordon Metal Co., Richmond, Va., has been awarded a tonnage for road signs and markers by the state of Virginia. A pickup is noted in demand for terne plate for roofing, mainly from the South.

**Buffalo** — Daily average sheet orders during the week were 25 to 50 per cent in excess of third quarter averages. If the improvement continues an early increase in output, which still holds around 15 per cent, is likely.

**Cincinnati**—Orders show moderate improvement, although still held close to immediate requirements. Demand from miscellaneous sources accounts for a slight increase in production in this district.

**St. Louis**—Lagging tendencies continue in demand for steel sheets. There is some purchasing from day to day, but orders are mainly for small lots, and come from miscellaneous users.

# Railroads

**Track Material Prices, Page 59**

Car buying has been negligible since the recent placing of 75 tank cars by the Corn Products Refining Co. Delaware, Lackawanna & Western, however, is planning to resume its car repair program on at least a limited scale, following suspension of several weeks.

Action is expected momentarily in the placing of approximately 58 electric locomotives by the Pennsylvania. The Chicago, Milwaukee, St. Paul & Pacific, recently noted as having placed two streamlined locomotives with an unnamed builder, has awarded this equipment to the American Locomotive Co., according to reliable information.

Lehigh Valley has reduced its proposed purchase of coal cars from 400 to 300 and box cars to be repaired from 1500 to 1350. Specifications may not be out for another month, pending government loan negotiations.

Two eastern railroads have bought a considerable number of car wheels. The New York Central has resumed repair work at its West Albany, N. Y., and Avis, Pa., shops. A New York surface line is expected to inquire late this year for an indefinite number of cars.

Though railroads are compiling budgets for 1935 it is regarded as only routine procedure and not necessarily forecasting further rail purchases, especially in view of the large stocks of steel rails yet inlaid.

Freight car builders have practically completed orders placed earlier in the year and railroad shops have only routine repairs, for most part. While plans are being made for various types of streamlined passenger equipment little of this has reached the stage of contracts. Atchison, Topeka & Santa Fe has given the Safety Car Heating & Lighting Co., New York, a contract for installing air conditioning equipment in 80 additional cars, with a possibility of increasing the order to 200 cars.

## Car Orders Placed

Corn Products Refining Co., Jersey City, N. J., 75 tank cars, to the General American Tank Car Corp.; this order was noted in a recent issue as placed by an unidentified company and as going to the Sharon, Pa., works of the Standard Tank Car Co., which is a subsidiary of the General American corporation.

## Locomotives Placed

Chicago, Milwaukee, St. Paul & Pacific, two streamlined locomotives, to American Locomotive Co., Schenectady, N. Y.; this was previously reported as going to an unidentified builder.

## Car Orders Pending

Lehigh Navigation Coal Co., Philadelphia, three air dump cars of 30 cubic yards capacity; bids asked.

# Pipe

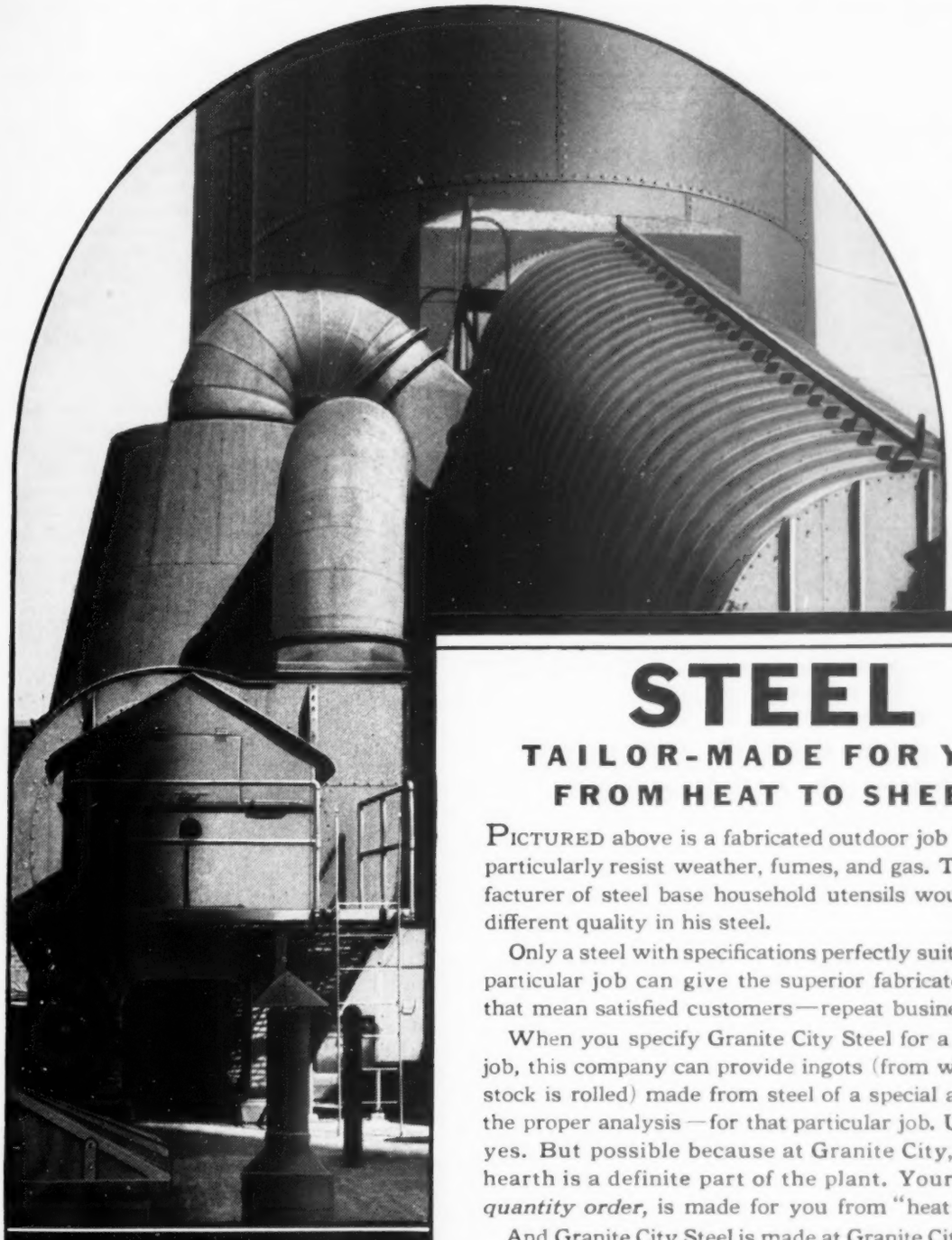
**Pipe Prices, Page 59**

**Pittsburgh**—Inquiry from the Sun Oil Co., Philadelphia, for a 6-inch line pipe from Philadelphia to Newark, N. J., approximately 100 miles in length, does not appear to have been closed despite reports last week that this order had been awarded to a German maker. It is probable that this inquiry will be closed on definitely by next spring with the source of supply still uncertain. Meanwhile, line pipe buying is restricted, not only by the approaching season but by failure of adequate financing, although shipments of oil country goods are at a fair rate.

**Cleveland**—Specifications are being prepared by Cleveland city engineers for a sewage ejection line, requiring 2800 tons of 12-inch cast iron pipe, for which bids will be taken early in November. This is part of the easterly disposal system for which a large tonnage of pipe, plates and shapes was awarded several months ago. Youngstown, O., water department purchased 100 tons of cast pipe. Demand for seamless tubes has improved slightly. Boilers have been purchased for re-equipping two United States Steel Corp. lake vessels.

**Chicago** — Approach of colder weather is seen as having a retarding effect on cast iron pipe purchases for certain types of installations during the next several months. While pipe can be laid for some purposes, delays in the commencing of work earlier this year will serve to postpone the placing of a number of prospective orders until next year. Awards are awaited on 700 tons pending for Madison, Wis.

**Boston**—Cast pipe buying has dropped, but the outlook for purchasing later than usual this fall is encouraging. For sewage or water line projects, miscellaneous tonnages



# STEEL

## TAILOR-MADE FOR YOU FROM HEAT TO SHEET

PICTURED above is a fabricated outdoor job that must particularly resist weather, fumes, and gas. The manufacturer of steel base household utensils would need a different quality in his steel.

Only a steel with specifications perfectly suited to each particular job can give the superior fabricated results that mean satisfied customers—repeat business.

When you specify Granite City Steel for a particular job, this company can provide ingots (from which your stock is rolled) made from steel of a special analysis—the proper analysis—for that particular job. Unusual—yes. But possible because at Granite City, the open hearth is a definite part of the plant. Your steel, on *quantity order,* is made for you from "heat to sheet."

And Granite City Steel is made at Granite City, Illinois, only 15 minutes from St. Louis, served by 29 railroads and the Mississippi River—better service to the Mississippi Valley, the West and the Southwest.

GALVANIZED SHEETS
STEEL SHEETS
PLATES AND
TIN PLATE

NRA

SINCE
GRANITE CITY STEEL
1878

## GRANITE CITY STEEL CO

GRANITE CITY, ILLINOIS
5719 Ellsworth Ave., Dallas
916 Walnut Street, Kansas City
1805 Boatmen's Bank Bldg., St. Louis
1613 Pioneer Building, St. Paul.
1502 Mariner Tower, Milwaukee
110 South Dearborn Street, Chicago

are active at Danbury, Conn.; Weymouth, Mass., and North Adams, Mass.

**Philadelphia**—While considerable cast pipe work for PWA projects is in prospect, little definite assurance prevails as to when it will mature. Meanwhile steel pipe tonnage is moving slowly.

**New York**—Cast pipe buying and inquiry is light, the former generally in small lots. At least 2000 tons is expected out shortly for a Westchester county municipality. New York city is also likely to purchase additional pipe for use in relief work.

**Buffalo**—Demand for pipe continues active with large tonnages pending for oil and gas lines proposed in nearby areas. The present quarter will not see the usual seasonal decline in pipe sales in this territory, it is predicted.

**Birmingham, Ala.**—Several thousand tons of cast iron pressure pipe mainly for the Far West, is included in prospective business. All pipe shops are in operation, but not on full time.

## Cast Pipe Placed

385 tons, 6 and 10-inch, Cornelia, Ga., to National Cast Iron Pipe Co., Birmingham, Ala.

210 tons, East Bloomfield, N. Y., to United States Pipe & Foundry Co., Burlington, N. J.; tank to Chicago Bridge & Iron Works, Chicago.

200 tons, Savanna, Ill., to James B. Clow & Sons, Chicago.

175 tons, Youngstown, O., to James B. Clow & Sons, Chicago.

110 tons, Highland Park, Mich., to James B. Clow & Sons, Chicago.

## Cast Pipe Pending

2800 tons, 12-inch, easterly sewage disposal system, Cleveland; bids in November.

800 tons, Benld, Ill.; Merkle Construction Co., Kansas City, Mo., general contractor.

653 tons, 6 to 8-inch, class 150 and 250, Oakland, Calif.; National Cast Iron Pipe Co., Birmingham, Ala.

425 tons, 8-inch and under, Lebanon Junction, Ky.; bids Oct. 29; also 75,000-gallon storage tank.

225 tons, 6-inch, Madison, N. C.; bids Oct. 23.

150 tons, 20-inch, Lake Forest, Ill.; bids Oct. 22.

Unstated tonnage, 5000 feet of 6-inch, Watertown, Wis.

## Coke By-Products

**Coke By-Product Prices, Page 59**

**New York**—Supplies of benzol for motor fuel are light, with demand fairly brisk. Toluol buying is steady, but somewhat below last year at this time. A sharper curtailment in production this year, however, balances stocks. Other distillates are unchanged. Naphthalene shipments have improved slightly.

# Shapes

**Structural Shape Prices, Page 58**

**New York**—Bids on the downtown Manhattan federal building have again been postponed, to Nov. 9. This project, requiring slightly more than 20,000 tons of steel, came out two years ago, but has never been bid. Awards are few, and new inquiry is quiet, mainly for state and railroad bridges.

According to preliminary reports to the American Institute of Steel Construction, September bookings were less than half the monthly average during the first half of this year, and nearly 40 per cent less than for the same month last year. Shipments, however, were 26 per cent larger than during September last year, though less than in July or August this year.

**Pittsburgh**—Plans are out for a 2363-foot through truss and plate girder bridge in Armstrong and Westmoreland counties, Pennsylvania, to be bid to the state, Nov. 2. There are three schedules and estimates of structural steel required range from 1192 tons to 1246 tons. Plans are expected in another six weeks from Pittsburgh army engineers on about 700 tons of shapes for two gates for the Pickwick lock in the Tennessee river. The market is steadier at 1.80c, Pittsburgh, for plain structural material, but little stability is evident in fabricated prices.

**Chicago**—While structural orders are more numerous, most of them involve individual lots of less than 500 tons. Private building work is slow to improve but is slightly more active than early this year. Inquiries are few and consist principally of state bridges.

**Boston**—Great Lakes Construction Co., Chicago, is low for the general contract, parcel post building superstructure, Boston, taking close to 9000 tons. Fourteen contractors bid. Awards are light, including 400 tons for a Springfield, Mass., bank. Fresh inquiry is not heavy, but includes a 400-ton bridge over the Mystic river, Boston.

**Cleveland**—Moderate size industrial projects are more in evidence. Owens Bottle Co., Toledo, O., has revived its inquiry for 300 tons, and the Isaly Dairy Co., Youngstown, O., is in the market for 150 tons. Railroads are buying small lots for bridge repairs.

**Philadelphia**—Except for approximately 800 tons for two projects here, the Delaware river bridge improvement and the federal aircraft factory, little tonnage is pending in the structural market. Recent orders have involved three contracts totaling 1090 tons. Plain shapes are 1.90c, Bethlehem, Pa., or 2.00½c, Philadelphia.

## Shape Awards Compared

| | Tons |
|---|---|
| Week ended Oct. 20 | 14,973 |
| Week ended Oct. 13 | 15,481 |
| Week Ended Oct. 6 | 19,984 |
| This week in 1933 | 6,332 |
| Weekly average, 1933 | 9,296 |
| Weekly average, 1934 | 16,652 |
| Weekly average, September | 12,154 |
| Total todate, 1933 | 606,385 |
| Total to date | 716,079 |

## Shape Contracts Placed

3600 tons, dam, Trempealeau, Wis.; 2100 tons shapes and plates, to American Bridge Co., Pittsburgh; 1500 tons, piling, to Illinois Steel Co., Chicago.

1600 tons, piling, lock and dam No. 2, Cape Fear river, United States engineer, Wilmington, N. C., to Carnegie Steel Co., Pittsburgh.

1115 tons, hangar, North Island, Calif., to Pacific Coast Steel Corp., San Francisco.

860 tons, classroom building, Fordham university, New York, to Bethlehem Fabricators Inc., Bethlehem, Pa.; through Sobray-Whitcomb Inc.

750 tons, high school, Hamden, Conn., to Bethlehem Fabricators Inc., Bethlehem, Pa.; through Industrial Construction Co., Hartford, Conn.

600 tons, Lincoln avenue bridge, Niles Center, Ill., to Gage Structural Steel Co., Chicago.

550 tons, race track addition, Arcadia, Calif., to Consolidated Steel Corp., Los Angeles.

515 tons, bridge, Prophetstown, Ill., to McClintic-Marshall Corp., Bethlehem, Pa.

460 tons, Junior high school, Reading, Pa., to McClintic-Marshall Corp., Bethlehem, Pa.

400 tons, highway bridges, Nebraska, to McClintic-Marshall Corp., Bethlehem, Pa.

400 tons, federal land bank, Springfield, Mass., to Shippers' Car Line Inc., Milton, Pa.

390 tons, miscellaneous state bridges, Lackawanna county, Pennsylvania, route 35009, awarded through Sweeney Bros., Scranton, Pa., to the McClintic-Marshall Corp., Bethlehem, Pa.

375 tons, galvanized towers, Long Island Lighting Co., New York, to Lehigh Structural Steel Co., Allentown, Pa.

370 tons, plant addition, American Steel Foundries, Granite City, Ill., to unstated fabricator.

350 tons, building, Ashland, Nebr., to Hansell-Elcock Co., Chicago.

320 tons, high school, Sioux Falls, S. Dak., to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

250 tons, bridge, Lancaster, Ky., to Vincennes Bridge Co., Vincennes, Ind.

250 tons, hangar No. 235, France field, Canal Zone, to unnamed interest.

248 tons, bridge and approaches, crossing Central railroad of New Jersey, and completion of approaches, Delaware, Lackawanna & Western rail-

road, route 30, section 8A, Hampton, Hunterdon county, New Jersey, to Phoenix Bridge Co., Phoenixville, Pa.; Franklin Contracting Co., general contractor.

200 tons, bridge, Macon, Miss., to Ingalls Iron Works Co., Birmingham, Ala.

180 tons, building 35, Cincinnati Chemical Works, Cincinnati, to L. B. Schreiber & Sons, Cincinnati.

170 tons, building No. 4, Colgate Co., Jeffersonville, Ind., to Bedford Foundry & Machine Co., Bedford, Ind.

175 tons, bridge, Kemmerer, Wyo., to Midwest Steel & Iron Works Co., Denver.

165 tons, building, Bower Roller Bearing Co., Detroit, to Palmer, Bee Co., Detroit.

135 tons, highway bridge, Flomaton, Ala., to Nashville Bridge Co., Nashville, Tenn.

125 tons, Minnesota state highway bridge, Amboy, Minn., to Minneapolis-Moline Power & Implement Co., Minneapolis.

120 tons, state highway bridge, RC-3562, Oxford-Chester highway, 5297, Orange county, New York, to American Bridge Co., Pittsburgh; Manstin Construction Co., Napanoch, N. Y., general contractor.

100 tons, bridge, Herford Junction, Wis., to McClintic-Marshall Corp., Bethlehem, Pa.

100 tons, residence, Raymond Pitcairn, Bryn Athyn, Pa., to McClintic-Marshall Corp., Bethlehem, Pa.

100 tons, school, Albany, N. Y., to James McKinney & Sons, Albany, N. Y.

## Shape Contracts Pending

9000 tons, superstructure, parcel post building, South station, Boston; Great Lakes Construction Co., Chicago, low on general contract.

2300 tons, state bridges, Oklahoma.

1297 tons, state bridge and highway projects, Louisiana; bids to state highway commission, Baton Rouge, Nov. 14.

1200 tons, depending upon one of three schedules, 2363-foot through truss and plate girder bridge between Armstrong and Westmoreland counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 2.

825 tons, structural work, Delaware river bridge commission, Philadelphia; E. R. Morehouse Co., Camden, N. J., low on general contract. This work was originally estimated at 2000 tons.

825 tons, bus terminal and theater, New York.

700 tons, two double skin plate gates, designed for the 110 x 600 x 61 foot Pickwick lock, Tennessee river; plans expected in December from Pittsburg army engineers.

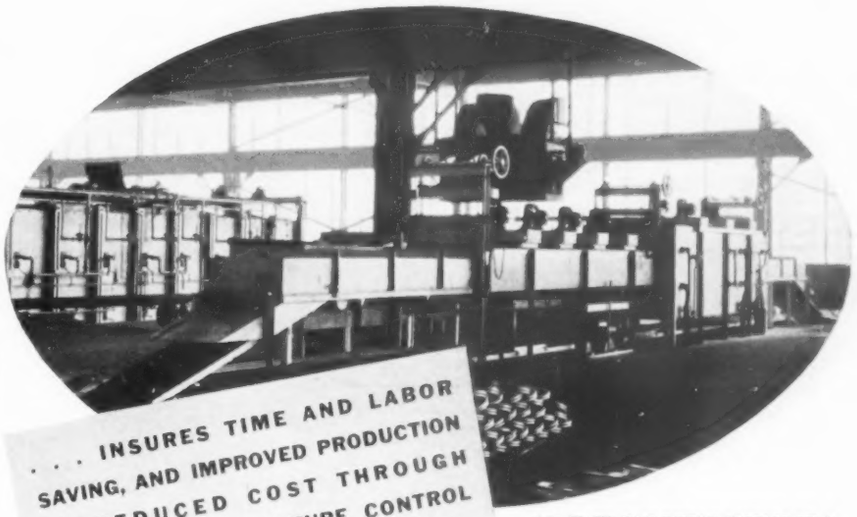
600 tons, two steel water-jacketed municipal incinerators, Pittsburgh; one, 400 tons, provisionally awarded Oct. 17 jointly to Koppers Construction Co., Pittsburgh, and Hiler Engineering Co.; the second, 200 tons, provisionally awarded to DeCarie Incinerator Co., New York.

500 tons, auditorium, San Jose, Calif.; Chas. A. Thomas, San Jose, Calif., low for general contract.

460 tons, state bridges, Wisconsin.

450 tons, bridges, Lehigh Valley rail-


# THIS ELECTRIC
# BRIGHT ANNEALING FURNACE

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Naturally, the builders of this furnace took no chances with the insulation. Armstrong's high temperature products were used throughout this new Electric Furnace Company installation. These highly efficient insulating brick prevent heat dissipation and waste—help importantly to maintain constant uniform temperatures, at the same time reducing fuel costs.

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road, South Plainfield and Picton, Union county, New Jersey.

400 tons, bridge, Mystic river, Boston.

360 tons, state highway work over Mora river, New Mexico.

305 tons, 15 bridges, Wharton county, Tex.; bids Oct. 31.

300 tons, remodeling building, Owens Bottle Co., Toledo, O.

230 to 750 tons, aqueduct, Los Angeles; bids opened.

225 tons, bridge, Thompson Falls, Mont.; bids opened.

220 tons, state highway bridge, Pike county, Kentucky.

175 tons, grade elimination, Delaware & Hudson railroad, Windsor, N. Y.

160 tons, building alterations, Isaly Dairy Co., Youngstown, O.

135 tons, state bridge, Nasemond river, Suffolk, Va., previously noted as involving an unstated tonnage; bids to be opened Oct. 23.

100 tons, Macy street subway, Los Angeles; bids soon.

100 tons, sheet piling, Vasona dam, Santa Clara county, California; Carl Swenson, San Jose, Calif., general contractor.

# Reinforcing

**Reinforced Bar Prices, Page 59**

**Chicago**—Despite lack of large awards, the market remains fairly active from the standpoint of pending and prospective work. Private construction retains the better activity noted during recent months, although public jobs furnish the bulk of orders. Several hundred tons of bars for Illinois road work are pending on a recent list.

**Pittsburgh** — Pennsylvania state highway work continues to feature the market. New billet steel bars for reinforcing purposes hold at 2.05c, base Pittsburgh.

**Cleveland**—Austin Co., Cleveland, has been awarded the general contract for the Continental Can Co.'s $100,000 expansion project at Houston, Tex., which will require 128 tons of concrete bars and 74 tons of structural shapes. Purchases generally range from 25 to 50 tons for miscellaneous building purposes. Another list of highway prjoects has been issued by the Ohio state highway department for bids Oct. 26, several undred tons now pending.

**Boston**—Pending tonnage is fairly large, led by 1500 tons for the parcel post building, Boston, on which bids are in. New inquiry and a few awards include small bridges and highways. For an airport at Providence, R. I., 300 tons of mesh has been awarded.

**New York**—Highway mesh continues in fair demand. Approximately 700 tons was placed last week, and 550 tons are to be purchased for a New Jersey highway this week. Bids close Oct. 23 and 30 for New York state requirements, about 800 tons of mesh. Billet bars are less active, the largest award 680 tons going to a Jersey City, N. J., fabricator.

**Philadelphia**—With the placing of two orders, involving approximately 700 tons, and with several hundred tons of state work pending, the local reinforcing bar market continues fairly active. Billet steel bars, cut lengths, continue at 2.05c, Pittsburgh, or 2.34c, Philadelphia.

## Reinforcing Steel Awards

680 tons, stores, Bronx (New York) market, to Joseph T. Ryerson & Son Inc., New York; Turner Construction Co., general contractor.

600 tons, Krebs Pigment & Color Co., Edgemoor, Del., subsidiary of E. I. du Pont de Nemours Inc., to unnamed interest.

400 tons, mesh, highway, Dutchess county, New York, to Kalman Steel Corp., Bethlehem, Pa.; through Thomas A. Brogan, Yonkers, N. Y.

311 tons, dam, Trempealeau, Wis., to Paper, Calmenson & Co., St. Paul.

300 tons, mesh, airport, Providence, R. I., to American Steel & Wire Co., New York.

232 tons, debris dam, Verdugo Wash, Los Angeles county, California, to Truscon Steel Co., Los Angeles.

250 tons, mesh, highway, Chemung county, New York, to Kalman Steel Corp., Bethlehem, Pa.; Warren Bros. Roads Co., Cambridge, Mass., general contractor.

220 tons, mesh, highway, Wayne county, New York, to unstated fabricators; through Manitou Construction Co., Rochester, N. Y.

200 tons, mesh, highways, Saybrook and Fairfield, Conn., to American Steel & Wire Co., New York.

128 tons, and 74 tons of shapes, building, Continental Can Co., Houston, Tex., to Austin Co., Cleveland.

110 tons, sewage projects, Cedarhurst and Great Neck, N. Y., to National Bridge Co., Long Island City, N. Y., and Carroll-McCreary & Co. Inc., Brooklyn, N. Y., two contracts.

100 tons, plant addition, Scott Paper Co., Chester, Pa., awarded through Wark & Co., Philadelphia, general contractors, to Taylor, Davis Inc., Philadelphia.

## Concrete Awards Compared

| | Tons |
|---|---|
| Week ended Oct. 20 | 3,531 |
| Week ended Oct. 13 | 4,740 |
| Week ended Oct. 6 | 2,409 |
| This week in 1933 | 1,043 |
| Weekly average for 1933 | 3,232 |
| Weekly average, 1934 | 4,600 |
| Weekly average, September | 2,604 |
| Total to date, 1933 | 152,759 |
| Total to date, 1934 | 197,804 |

## Reinforcing Steel Pending

1452 tons, state bridge and highway projects, Louisiana; bids to state highway commission, Baton Rouge, Nov. 14.

1275 tons, Macy street subway, Los Angeles; bids soon.

400 tons, auditorium, San Jose, Calif.; Charles A. Thomas, San Jose, low for general contract.

156 tons, approximately, depending upon one of three schedules, approach work to 2363-foot through truss and plate girder bridge between Armstrong and Westmoreland counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 2.

111 tons, state highway work, Santa Barbara county, California; bids Oct. 31.

110 tons, state crossing, Kern county, California; bids Oct. 31.

104 tons, 15 bridges, Wharton county, Texas; bids Oct. 31.

103 tons, Weiser river bridge, Washington county, Idaho, for state; bids Oct. 26.

# Strip Steel

**Strip Prices, Page 59**

**Pittsburgh** — Strip steel buying, especially hot rolled, shows more promise. A greater diversification is evident and the market reflects strength not apparent for some weeks. Cold-rolled strip steel is steady at 2.60c, base, Pittsburgh. If the gage can be produced, Chrysler Corp. plans to specify .030 gage hot-rolled pickled sheets instead of strip, to be brass and chrome plated, for the order recently placed for 2,000,000 hub caps with the Moto-Meter Gauge & Equipment Corp., Toledo.

**Chicago**—Strip demand generally is slow and the automotive industry has entered the market on only a small-lot basis but heavier buying is looked for shortly. Consumers principally are interested in placing orders for spot shipments, with forward buying lacking.

**Boston**—Cold-rolled strip demand covers a fairly wide range, but total volume is light, with buying in small lots. Rolling schedules are unsettled with few mills having sufficient orders to provide sustained operation. Hot strip is also sluggish.

**Philadelphia**—Strip demand is expanding slowly, with the market unchanged at 1.85c, Pittsburgh, or 2.14c, Philadelphia, and cold-rolled strip, at 2.60c, Pittsburgh, or 2.89c, Philadelphia.

**New York**—A new price has been filed with the American Iron and Steel institute on hot-rolled ingot iron strip, effective Oct. 26, reducing it $2 a ton from 2.20c to 2.10c, base

Pittsburgh. This is done to bring this product in line with other materials and does not affect steel strip. Activity in steel strip is confined to small orders, with little change in total tonnage.

## Wire

Wire Prices, Page 59

**Pittsburgh**—A growing number of small orders features the market for merchant and manufacturers' wire products. Some jobbers are now moving stocks more actively, mainly nails and fencing, and the automotive industry is entering orders for delivery later in the quarter. The market is $2.60 per keg, Pittsburgh or Cleveland, on nails; 2.30c for plain wire and $63 per column on fencing.

**Cleveland**—Demand for manufacturers' wire improved moderately during the week, one of the reasons for increasing ingot production in this district. Some substantial orders were received for wire rods and welding wire. Little merchant trade was noted; nails were inactive.

**Chicago**—Wire and wire products are in steady demand, sales and specifications the past week being about equal to those of the several preceding weeks. Miscellaneous consumers of manufacturers' wire generally show little change in their requirements while activity in wire products remains slow, particularly in farm districts.

**Boston**—Wire buying varies only slightly, with small orders prevailing for early delivery. Elevator cable requirements for the parcel post building, Boston, are the largest for this type of outlet in some time here, Gurney Elevator Co., New York, being low at $94,800. Plain wire to the manufacturing trade is steady at 2.40c.

**Philadelphia**—Wire sellers here reported little improvement and complain of foreign competition on nails along the Southern Atlantic seaboard. Prices are unchanged.

## Quicksilver

**New York**—Quicksilver prices are unchanged and untested in a quiet market. Small lots are $74.50, a virgin flask of 76 pounds, and round lots down to $73.50 a flask.

## Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 59

Following a period of sharp competition in the nut and bolt industry, which is not operating under a code, nut and bolt prices throughout the bulk list have been reduced by another 10 per cent discount. Machine bolts now are 70-10-10-10 off list. Milled hexagon cap screws and square head set screws also have been reduced by another 10 per cent. No change has been made in the package list.

Pontiac and Chevrolet recently issued inquiries, and moderate improvement is noted in orders from automobile manufacturers and jobbers.

Large rivets hold at 2.90c, Cleveland or Pittsburgh, and 3.00c, Chicago and small rivets at 70-5 off list.

## Cold Finished

Cold Finished Prices, Page 59

**Pittsburgh**—Following two weeks of steadily improving specifications


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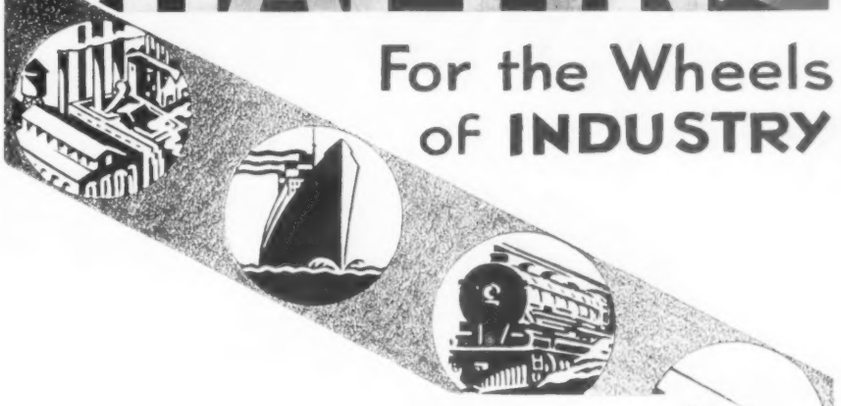

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for cold-finished steel bars which had placed buying at a level some 30 to 40 per cent ahead of the comparable period in September, a lull was noted in the market last week. Only small orders are coming from the automotive industry, but agricultural implement makers are still fairly active buyers. Carbon cold-drawn bars are firm at 2.10c, base Pittsburgh, and alloy bar base at 2.95c.

New prices have been filed on diaphragm steel, Cleveland base, on cold-rolled chrome vanadium, 12 cents per pound and on untempered straight carbon steel 13.5 cents per pound, effective Oct. 26.

## Tin Plate

**Tin Plate Prices, Page 58**

**Pittsburgh**—Tin plate demand is subsiding. Although operations in the industry were at 40 per cent last week, declines are near at hand. Canmakers will reduce inventories over the next two months. Producers consequently have small backlogs, and some material is going into mill stocks. Tin plate holds at $5.25 per base box price. Pittsburgh, and black sheets, tin mill sizes, remain 2.75c, base Pittsburgh.

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# Pig Iron

**Pig Iron Prices, Page 60**

**New York**—While base prices are unchanged, the differential on all grades of pig iron with less than 1.75 per cent silicon, has been increased from 25 to 50 cents. Consequently gray forge iron has been reduced 25 cents a ton to $18, base, valley and Pittsburgh district furnace. There has been comparatively little demand for grades under 1.75 silicon in recent years. Sellers generally report a slow but gradual improvement in pig iron demand. The Troy, N. Y., furnace is reported to have been banked recently, leaving no merchant furnace in operation along the Atlantic seaboard.

**Pittsburgh**—Initial orders for pig iron were placed last week on the railroads' airbrake re-equipment program by a local manufacturer. Orders were small and the buyer plans to take in iron on a piecemeal basis. If iron were used 100 per cent to the exclusion of scrap, this 10-year airbrake program would take some 500,000 tons, but scrap will supply a large share of the raw material requirement. Several radiator and sanitary-ware foundries have been active here, melting schedules running up to five days weekly. Southern iron continues to move into Pittsburgh at times at its 38-cent per ton differential. The local base continues $18.50 for foundry grades, $18.00 on basic and $18.50 for bessemer.

**Cleveland**—Melters are buying close to actual requirements. Orders have increased in number, but not in size. Instead of making one order purchase for a month's requirements, consumers buy from week to week. Contracting for a quarterly period has disappeared. With few exceptions, foundries are not carrying stocks. Shipments continue to improve over the September rate, with automotive, stove and implement interests leading in orders, and railroads at the bottom of the list.

**Chicago**—Gradual reduction in pig iron stocks accumulated during the first half is reflected in the appear-

ance of orders from consumers out of the market for several months. Sales and shipments continue to show a fair gain over September as foundry schedules continue to increase. Automotive foundries are taking larger lots and this tendency is expected to continue for several months to fill requirements for new car models. Pig iron buying still is principally of a spot nature, with the market continuing $18.50, furnace, for No. 2 foundry and malleable.

**Boston** — Pig iron demand is slightly heavier, although largely in small shipments of the higher silicon grade and well distributed among sellers in this territory. There has been little improvement in foundry operations with possible exception of stove and valve makers.

**Philadelphia**—Little more life is noted in pig iron. Orders are still confined to small lots, but they are more numerous and featured by certain urgency which indicates that stocks of the buyers have been virtually cleaned up. Prices are steady. One sale of 100 tons of Russian iron is reported in this district.

**Buffalo**—One of four blast furnaces in production in this district during the greater part of this year will be withdrawn from the active list this week. Malleable and gray iron castings producers are operating on steadily increasing schadules and shipments are definitely upward.

**Cincinnati**—Pig iron sales are for prompt shipment and restricted to immediate needs. Shipments show little change and even at the present low rate of melt consumer stocks are dwindling. Recent pronouncements at Washington have steadied prices.

**St. Louis**—A continued large number of orders for small lots features the pig iron market.

The melt has maintained its recent moderate gains and a further increase during the past week or ten days has been noted. Blast furnace interests apparently are well supplied with iron.

**Birmingham, Ala.**—Sluggish buying of pig iron is still noted in this district with the steady melters, cast iron pressure pipe manufacturers, watching their needs closely and specifying to blast furnace interests the small tonnage deliveries desired. Stove foundries have been fairly active but aggregate needs in this industry are not extensive. Five blast furnaces continue in operation.

**Toronto, Ont.**—Business in the Canadian pig iron markets is beginning to show indications of improvement. Sales are largely confined to single car lots. Melters still are confining purchases to spot needs. Prices are firm and unchanged.

# Scrap

**Scrap Prices, Page 61**

**Pittsburgh** — A steadying set of circumstances developed in the market last week when a district independent mill in paying $10.35 per ton for small purchases of No. 1 heavy melting steel advanced its price slightly from the $10 level which had prevailed on a purchase two weeks ago. Furthermore, releases on scrap rails by another mill are noted, and now serve to align this market with heavy melting. Heavy demand continues for steel specialties, which with the exception of knuckles and couplers, are strong at $13.50 to $14. No. 2 heavy melting steel is stronger here, and a leading interest entered the market last week on a trial lot for the first time in several years.

**Cleveland**—Strength appearing in

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steel and iron scrap in adjoining consuming districts has had no effect here and shipments are small. Quotations are nominal and unchanged.

**Chicago** — Scrap is quieter, and light demand gives a slightly easier tone. The latter is reflected principally in lower prices bid in some instances by brokers although the consumers' market is quotably unchanged with heavy melting steel continuing $8.50 to $9. Fair activity still is noted in demand from foundries. Steel plants are taking light shipments against old orders and refrain from placing new business.

**Boston**—Sustained export volume continues to hold prices for heavy melting steel scrap above domestic delivered quotations, and shipments to district mills are light. Scrap for boat shipment is being attracted to Boston from points further inland than usual. Machine shop turnings are again firmer. Outside domestic prices are too low to attract tonnage here.

**New York** — For tonnage, better than $8, barge, has been paid for No. 1 heavy melting steel, but for smaller lots at docks, making up most of the volume, the two most active dealers are still paying $8 and $6.50 for No. 2. Demand for export continues heavy. In addition to melting steel, some stove plate and heavy machinery cast are being bought for export. Italy, Japan and England are taking scrap from this port. Domestic activity is light.

**Philadelphia** — Scrap prices here are nominally unchanged, with little trading to test the market. Domestic quotations on the melting steel grades are being supported in a noticeable degree by continued steadiness of prices for export. So far as can be learned, there have been no new orders from abroad, but shipments still are being accepted against contracts. The major cast grades are weak but unchanged.

**Buffalo**—A tonnage sale of heavy melting steel is believed near at hand. Dealers ask a minimum of $8.75, which has been paid recently for No. 2 heavy melting steel, while consumers have ideas 50 to 75 cents lower. Foundry and blast furnace scrap are moving more freely but in small quantities. The trade is greatly improved in comparison with third quarter and the list is reasonably firm.

**Detroit**—The market is quiet with prices generally steady. No. 1 heavy melting steel is unchanged at $7.50 to $8 on the basis of last sales, with $7.50 to $7.75 bid by sellers in covering old orders. New business is light.

**Cincinnati** —Trading in iron and steel scrap is light, with mills not interested in new purchases and foundry needs unimproved. Prices on miscellaneous purchases in this market are nominal.

**St. Louis**—The expected revival in iron and steel scrap buying has failed to materialize, the market continuing dull and weak. Generally dealers now are of the belief that betterment will not develop before well into November, when it is thought that purchasing by mills will start.

**Birmingham, Ala.**—Export possibilities from this district are rather vague at the price offered, delivered on coast. The local scrap iron and steel market has been dull for several weeks, with no indication of early improvement. Prices are low but holding more steadily now, heavy melting steel around $8.

**Toronto, Ont.**—Trading in iron and steel scrap shows practically no change. Sales are confined to special grades in small lots. Steel scrap is practically at a standstill and only odd shipments are being made to the Hamilton district. Foundry interests are taking regular deliveries of iron scrap in small lots. Dealers are out of the market and prices unchanged.

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# Warehouse

**Warehouse Prices, Page 62**

**Pittsburgh**—Warehouse steel orders are scarcely larger than those in September, although last week jobbers here reported some good days, from the standpoint of total tonnage. Prices are fairly well maintained although the operation of recent mill extras on sheets has created some apparent warehouse inequalities.

**Cleveland**—Little change is noted by most of warehouse interests here in volume or number of orders this month, compared with September. Some sellers reported a slight shrinkage in business for last week. Prices are steady.

**Chicago**—The rising trend in warehouse sales that started the middle of September has been maintained, with orders the past two weeks highest for any fortnight previously this year. Prices are unchanged.

**Boston** — Warehouse sales are small lots, with slight gains in number. No. 24 one-pass cold-rolled sheets now are 3.90c, with No. 24 uniform blue annealed sheets 4.40c, and No. 24 lead coated long ternes 5.55c, reductions of $1 a ton. These prices are based on 50-bundle orders.

**New York**—Volume has gained gradually during the last three weeks with most warehouse distributors. Indications are October will be the best month since spring. Buying is well spread with prices unchanged.

**Detroit**—Sales are well maintained for the month to date and show improvement compared with September. Prices are unchanged.

**Cincinnati**—Some orders which may be traced to government proj-

ects have bolstered warehouse volume against a slight decline in industrial business.

**St. Louis**—Business of iron and steel warehouses is spotty. There is gradual broadening in requirements of the general manufacturing trade, but aside from fairly extensive repair operations, building is slow.

## Iron Ore

**Iron Ore Prices, Page 60**

**Cleveland**—Consumption of Lake Superior iron ore in September was 14 per cent less than in August, and 41 per cent lower than in September last year. Despite the fact shipments for the season have been held down to about 22,000,000 tons, compared with 21,600,000 tons last year, stocks at lower lake docks and furnaces are 1,464,782 tons higher than last year, as of Oct. 1. The Lake Superior Iron Ore association reports:

| | Tons |
|---|---|
| Consumed in August | 1,443,943 |
| Consumed in September | 1,236,392 |
| Decrease in September | 207,551 |
| Consumed in September 1933 | 2,102,076 |
| On hand at furnaces Oct 1, 1934 | 29,713,032 |
| On Lake Erie docks Oct. 1, 1934 | 5,200,825 |
| Total at Furnaces and Lake Erie docks Oct. 1, 1934 | 34,913,857 |
| Total Oct. 1, 1933 | 33,449,075 |

## Semifinished

**Semifinished Prices, Page 59**

A slightly better trend is noted in the billet market as some forging shops have increased the number of working days. Improvement in movement of wrought iron forging billets especially to several railroad buyers also has been reported. Sheet bars are in slow demand. Pittsburgh bases on billets at $27, sheet bars at $28, and wire rods at $38 per ton, appear steadier.

## Metallurgical Coke

**Coke Prices, Page 59**

Four or five large foundries making radiators and sanitary ware in the Pittsburgh district have been specifying metallurgical coke in fair volume. By-product grades have been competing with beehive recently. An airbrake foundry there also has been increasing its coke commitments. The domestic coke market continues to show by far the most promise for by-product coke oven operators.

Beehive sellers name bases of $4.60 on foundry and $3.85 on furnace grades, both Connellsville, Pa., ovens, for prompt shipments. Deductions are allowable for contracts but few buyers are thus availing themselves. Premium foundry coke holds at $5.10 to $5.35 per ton.

Shipments of foundry coke at Chicago are increasing, with demand well distributed. The price is steady at $8.50, ovens, for outside delivery and $9.25, delivered, Chicago.

Shipments of by-product foundry coke are larger at Cincinnati and prices are steady. Birmingham, Ala., producers continue their rate of activity, with $6, ovens, holding steady. Domestic demand is increasing.

## Ferroalloys

**Ferroalloy Prices, Page 60**

Ferromanganese releases are slightly better, with the market holding unchanged at $85, duty paid, Atlantic and Gulf ports. Domestic spiegeleisen, 19 to 21 per cent, $26, furnace, on lots up to 50 tons, and $24 on 50 tons and over.

## Nonferrous Metals

**Nonferrous Metal Prices, Page 60, 61**

**New York**—Improvement in demand for lead and copper carried into last week, with higher prices quoted on the former. Better sentiment in most nonferrous metals was again evident.

**Copper**—Sales were moderate and averaged around 600 tons daily. Consumers seem confident that prices will not go lower than the current 9.00c level. Several primary producers are expected to curtail output about 20 per cent, the pace having been set by Kennecott. Sales abroad were fairly active at prices ranging from 6.40c to 6.50c, c.i.f.

**Lead**—Active sales have stimulated prices. American Smelting raised its published quotation Wednesday $1 a ton. St. Joseph Lead stepped up its price by the same amount. Corresponding advances of $1 each were announced by these sellers Thursday. The metal at the week-end was quoted 3.70c to 3.75c, New York, and 3.55c to 3.60c, East St. Louis, for spot through November. The way in which sales have held up at higher levels and reports of prospects of


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large October shipments give the market an unusually strong appearance.

**Zinc**—Prime western held steady at 3.80c, East St. Louis, with demand slow. Indications are that galvanizers may soon enter the market in a more active fashion. Strong ore prices are expected this week due to Tri-State producers curtailing output.

**Tin**—Consumers have shown little interest in the market. Straits tin prices moved within narrow limits and on a fractionally higher plane than during the preceding week. International Tin committee has announced that it will form an advisory panel of representatives from consuming countries, including the United States. Straits spot closed around the 51.00-cent level.

**Aluminum**—The market was quiet and prices unchanged for the week.

**Antimony**—Prices stiffened on reports of higher quotations in China and inquiries from European buyers where supplies are restricted. Closing quotation for the week was 9.50c to 9.75c, duty paid, for spot.

# Pacific Coast

**Pacific Coast Prices, Page 59, 60, 62**

**San Francisco**—*(By Air Mail)*—During the past week bids were opened on one of the aqueducts for the metropolitan water district, Los Angeles, involving 45,500 tons of reinforcing bars, 5800 tons of plates and 750 fons of structural shapes. The name of the low bidder or bidders has not yet been announced.

Reinforcing bar awards aggregated less than 1200 tons. The total for the year, however, is 34,000 tons more than for the same period last year. Truscon Steel Co. took 232 tons for a debris dam for Los Angeles county. New inquiries include 211 tons for highway work in California and 103 tons for a bridge in Washington county, Idaho. Bids will be called for soon on 1275 tons for the Macy street subway, Los Angeles. Unnamed interests took 105 tons of bar and strip steel for the Mare Island, Calif., and the Bremerton, Wash., navy yards.

Chicago Bridge & Iron Works booked the only plate award for the week, 120 tons for a 250,000-gallon tank and tower at Brawley, Calif. Western Pipe & Steel Co. was low on 5800 tons for a portion of the Los Angeles aqueduct. The Standard Oil Co. has indefinitely suspended improvements at Richmond, Calif., involving 1500 tons for additional tankage.

Shape awards were the smallest for any week in over a month, totaling less than 900 tons. Unnamed interests secured 250 tons for hangar No. 235, France Field, C. Z. The Macy street subway, Los Angeles, up for figures soon, will require 100 tons. No action has been taken on 500 tons for the San Jose, Calif., auditorium. The Vasona dam, San Jose, Calif., will require 100 tons of sheet steel piling on which bids have already been taken.

The cast iron pipe market is quiet and only two projects are pending. No action has been taken on 7469 tons of high pressure pipe for San Francisco. National Cast Iron Pipe Co. is low bidder on 653 tons of 4 to 8-inch, class 150 and 250, for Oakland, Calif.

## No Industrial Buying

**Seattle**—While no important iron or steel awards were released this week, considerable business is pending. Public works projects are furnishing practically all the activity, as industrial improvement or expansion is absent.

Seattle has purchased from the Pacific Railway Supply Co., 60 gross tons of relayer girder rails for $1665. United States lighthouse superintendent, Portland, Oreg., will open bids Oct. 24 for furnishing a 350-horsepower diesel rig for lightship No. 88, to be converted from a coal burner, also for structural changes.

The jobbing trade is fairly active in small lots, no particular item outstanding although sheets are moving more freely.

Cast iron pipe business continues slow, no tonnages of importance being up for figures. Dealers are selling small lots out of stock. Pacific Water Works Supply Co., Seattle is furnishing 45 hydrants for Coulee City. W. C. Hoffman, 628 Railway Exchange building, Portland will open bids Oct. 28 for a steel tank, two pump units and pipe for an improvement of the water system at Sylvan, Oreg.

Demand for scrap is about the same as last week. There is little local consumption but exporters are buying all suitable material offered. The movement to Japan continues fair.

# Steel in Europe

**Foreign Steel Prices, Page 62**

**London** — *(By Cable)* — Foreign trade of Great Britain made a decided movement to the favorable side in September, imports decreasing 12,640 tons from 102,165 tons in August to 89,525 tons in September, while exports increased 4599 tons from 193,412 tons in August to 198,011 tons in September.

Pig iron has been sold heavily by British makers for forward requirements. Sales of structural steel show progressive expansion and substantial tonnages for bridge work are expected to be released shortly. Galvanized sheets are more active on Australian and Japanese contracts.

The Continent reports domestic markets quiet but export sales satisfactory, especially to Japan, Great Britain and Rumania, mainly in semifinished forms. Producers in the United States seem to be taking the largest share of business in the Far East.

# Here and There In Industry

HARBISON-WALKER REFRACTORIES CO., Pittsburgh, has acquired American rights to forsterite patents of Goldschmidt and associates through an exclusive royalty granted by Dr. Victor M. Goldschmidt, Gottingen, Germany. These patents cover refractories made of olivine and other magnesium silicates. Included in the group are more than a dozen United States and Canadian patents. Forsterite has a melting point of 3490 degrees Fahr. and is said to be the only magnesium silicate that will remain stable at temperatures at which many industrial furnaces operate.

□ □ □

Perfex Radiator Co., Milwaukee, has bought C. R. C. Inc., Beloit, Wis., manufacturer of radio parts and has renamed it the Perfex Controls Co.

□ □ □

Ritterbush & Co. Inc., Church street, New York, dealer in equipment, recently established an office at 710 Park building, Pittsburgh, in charge of Louis Mardaga.

□ □ □

Consumers Steel Products Corp., Detroit, has moved to its new warehouse at 6540 East McNichols road. Cranes and equipment for handling and preparing sheets and strip to customers' requirements has been installed and a complete stock of sheets and strip provided.

□ □ □

American Playground Device Co., Anderson, Ind., has bought from the Lynch Corp., Anderson, a building formerly occupied by the latter and will start production there about Nov. 1. The company's former plant was burned in August. Most of the new equipment has been bought and installed.

# NRA

(Concluded from Page 16)

broader view there must be determined those general industrial policies that seem best adapted to encourage private enterprise and to promote a permanent advance in our economic comfort and security."

**THORP MADE AN ADVISER**

Dr. Willard L. Thorp, professor of economics, at Amherst college, and formerly director of the bureau of foreign and domestic commerce, has been appointed an associate economic adviser to the national industrial recovery board.

¶Final dates for entering objections to amendments to codes are Oct. 26 for the cast iron soil pipe industry, Oct. 24 for the hack saw blade industry, Oct. 26 for the ring traveler industry.

¶A hearing has been scheduled for Oct. 26 at the Carlton hotel, Washington, on proposed amendments to the code for the tool and implement manufacturing industry. These amendments requiring the plain labeling of "partly foreign made" products and gives the supplementary code authority right to issue NRA labels.

**NAME COMPLAINT COMMITTEES**

Trade practice complaint committees for the following industries have been approved:

Machine screw manufacturing industry (a division of the fabricated metal products industry): R. A. Gunn, Federal Screw Works, Detroit; W. H. Hill, Scovill Mfg. Co., Waterbury, Conn.; A. B. Peck, American Screw Co., Providence, R. I.; E. A. Thatcher, United Screw & Bolt Co., and E. M. Whiting, Pheoll Mfg. Co., Chicago; all members of the industry's Code Authority.

Compressed air industry: D. C. Koefe, Ingersoll-Rand Co., J. M. Brown, Sullivan Machinery Co.; and A. E. Goodhue, Chicago Pneumatic Tool Co., all of New York; W. H. Leonard, Gardner-Denver Co., Quincy, Ill.; and C. E. Searle, Worthington Pump & Machinery Corp., Harrison, N. J. These members also constitute the present membership of the industry's Code Authority.

Cap screw manufacturing industry: George P. Byrne, New York; R. M. Heames, Allied Products Corp., Detroit; W. H. Hill, Scovill Mfg. Co., Waterbury, Conn.; A. M. Jones, Buffalo Bolt Co., North Tonawanda, N. Y.; H. D. North, Ferry Cap & Screw Co., Cleveland; and H. E. Penfield, Chicago Screw Co., Chicago, all members of the industry's code authority.

Cutting die manufacturing industry (a division of the fabricated metal products industry): John J. Adams, John J. Adams Co., Worcester, Mass.; Wilson Palmer, United Shoe Machine Co., Beverly, Mass.; and Charles Messner, St. Louis Cutting Die Co., St. Louis code authority members; and Richard F. Hingston to be neutral agent.

## Navy Buying Tool Steel

Bureau of supplies and accounts, navy department, Washington, will take bids on Oct. 23 on 18,075 pounds of class T-C, high speed tungsten-cobalt tool steel. Bids will be taken at the same time for 17,400 pounds of Class T-1, round high speed tool steel.

# Equipment

**Washington** — Bids are to be opened by the ordnance department of the army on Nov. 19 and 20 for a large number of machine tools. Also Dec. 3, 4 and 5 have been tentatively set as dates on which to open further bids. These bids are all a part of the $2,309,000 grant which was made by PWA for the purchase of machine tools by the army. A total of some 800 items will be included on the two lists. It is expected specifications will be ready about a month in advance of the dates of the openings.

**New York**—Inquiry for machinery is slightly improved, but orders are still slow. An active demand continues for machinery for navy yards and ships. Most of the tools for the Bronx, N. Y., vocational school have been placed while those for the Brooklyn technical school are about to be closed. Several hundred machines are included, the business being widely distributed.

**Boston**—Except for navy rquirements or demand for equipment growing out of government contracts, machinery and equipment activity is light. Most shops are operating on curtailed schedules and, although some spotty improvement has taken place since the first of the quarter, the increase has been disappointing.

**Pittsburgh**—With the more or less definite assurance that Otis Steel Co. will not join with the prospective Corrigan - McKinney - Republic Steel Corp. merger odds favor inquiry before long by Republic Steel Corp. for a continuous mill at the Corrigan-McKinney works, again providing their merger is consumated. It had been stated previously that if Otis had joined the merger, such an improvement would only duplicate the present Otis continuous mill. Several promising inquiries for stands to finish precision rounds are before the steel mill equipment trade, as well as inquiry for several new heating furnace installations by several steel producers, including one in the Detroit district.

# Construction and Enterprise

## New England

FAIRFIELD, CONN.—Town, R. Garrabrants, chairman garbage disposal commission, plans to build a garbage incinerator and to buy trucks and build a garage at total cost of about $30,000.

ANDOVER, MASS.—Board of education will include in new junior high school a manual training shop and steam heating powerhouse, entire cost to be about $400,000. Perley F. Gilbert, Central Block, Lowell, Mass., is architect.

HAVERHILL, MASS.—Brauner Mfg. Co. has been organized to manufacture mechanical equipment by L. H. Karelitz, 6 Eleventh avenue, and associates.

## New York

FLUSHING, L. I., N. Y.—Queens Borough Oil Burner Corp. has been organized to manufacture oil burners, by C. C. Goodman, 260-1 Kensington place, Great Neck, L. I., and associates.

TANNERSVILLE, N. Y.—Board of education plans manual training department in new $300,000 high school for which plans are being made by R. R. Graham, 25 Prospect street, Middletown N. Y.

WELLSVILLE, N. Y.—City has voted $85,000 for a boilerhouse at the municipal waterworks and electric light plant. G. Esherick Jr., city hall, is engineer in charge. (Noted Oct. 8.)

## New Jersey

NEWARK, N. J.—Western Wire Forming Co. has been organized to manufacture wire products by J. W. Eckstedt, care Jacob Shevitt, 17 Academy street, Newark, N. J.

WOODBURY, N. J.—City plans to electrify the waterworks pumping station at cost of about $50,000 for which PWA allotment has been approved. F. F. Kaufman, 909 Pine street, Camden, N. J., is engineer.

## Pennsylvania

PITTSBURGH—Haller Baking Co., Denniston avenue, will receive bids un-

til Oct. 30 for bakery distribution plant and offices.

## Ohio

BRADNER, O.—City plans construction of a waterworks system costing $48,000 for which PWA loan and grant have been approved. George Champe & Associates, Nicholas building, Toledo, O., are engineers.

CANFIELD, O.—Village has been allotted loan of $70,000 for waterworks.

CINCINNATI—Oliffrich Brewing Co., 242 West McMicken street, has plans by Fosdick & Hilmer, Cincinnati, for a powerhouse addition to cost about $30,000.

CINCINNATI — Kroger Grocery & Baking Co., 35 East Seventh street, will take bids soon on powerhouse to cost over $100,000, including boilers, fuel pulverizers and other equipment. Tietig & Lee, 34 West Stxth street, Cincinnati, are architects. Fosdick & Hilmer, Union Trust building, Cincinnati, are engineers.

CLEVELAND — Aluminum Co. of America, J. P. Dearasaugh, construction engineer, 2210 Harvard avenue, is building a steel foundry, 85 x 100 feet, at that address.

COSHOCTON, O.—City has plans for extensions and improvements to municipal waterworks, including steam-operated electrical generator plant, motor-driven pumping units and auxiliaries. Fund of $164,000 is available through federal aid.

DOYLESTOWN, O.—Village plans construction of a waterworks plant to cost about $54,000 for which PWA loan and grant have been approved. G. B. Gascoigne, 1140 Leader building, Cleveland, is engineer.

FAYETTE, O.—City plans construction of a waterworks plant to cost about $60,000, for which PWA loan and grant have been approved. George Champe & Associates, Nicholas building, Toledo, O., are engineers.

PEMBERVILLE, O.—Village has loan of $75,000 for waterworks.

RICHWOOD, O.—Village has federal loan of $80,000 for waterworks system.

## Michigan

ELBERTA, MICH.—Village is considering construction of a waterworks system to cost $26,000. A vote on the proposal will be taken Oct. 30. Francis Engineering Co., Saginaw, Mich., has the plans.

ESCANABA, MICH.—Escanaba, Iron Mountain & Western railroad, care Chicago & North Western railroad, Chicago, has revised plans for repairing and improving its ore docks at cost of about $30,000. (Noted Oct. 1.)

HANCOCK, MICH.—Mineral Range Railway Co. has started construction of a roundhouse on Scott street.

LANSING, MICH.—Michigan state administrative board is planning the construction of a factory building to be erected at the state institution for the blind, Saginaw, Mich., for the manufacture of brooms. Estimated cost $130,000.

MENOMINEE, MICH.—City has been assured by PWA of the sum of $803,000 with which to build a municipal light and power plant. The agreement provides for the issue by the city of revenue bonds totaling $623,000.

PONTIAC, MICH.—Organization of the Pontiac Mfg. Co. has been completed for the production of replacement parts for the automotive trade. The concern has taken over a plant on Scott Lake road which also includes a custom foundry and a modern machine shop. Hugh Chalmers Jr. is president.

SAGINAW, MICH.—Francis Engineering Co., Saginaw, has completed plans for a sewage disposal plant at Spring Lake, Mich., to cost about $22,000.

SPARTA, MICH.—Sparta Coach & Body Co. is being organized to manufacture trailer coaches in the plant formerly occupied by the Welch-Wilmarth unit of the Grand Rapids Store Equipment Corp.

WYANDOTTE, MICH. — Standard Gray Iron Foundry Co., with offices in the General Motors building, Detroit, has leased the foundry equipment and building of Morris Birnbaum here, and will conduct a general business in gray iron castings.

## Indiana

AUSTIN, IND.—Public Service Co., Traction building, Indianapolis, is making plans for a power substation, transmission and distributing lines, to cost about $60,000.

COLUMBUS, IND.—Indiana Tool Co. has been reopened, after being closed three years, and will be expanded. H. E. Miller will manage the company.

MICHIGAN CITY, IND.—City plans a sewage disposal plant to cost $338,000 for which PWA funds are asked. C. Hurd, 1039 Architects building, Indianapolis, is architect. A bond issue will be submitted to a vote.

MUNCIE, IND.—Muncie Gear Co. is constructing an addition to its warehouse facilities.

## Illinois

ASHLAND, ILL.—Village has PWA allotment of $75,000 for waterworks.

CHICAGO—Edward Katzinger Co., 1949 North Cicero avenue, manufacturer of bakery equipment and tinware, has leased a 3-story factory building, more than 50,000 square feet of floor space, where automatic machinery will be installed for production of certain of its lines.

CHICAGO—Bready Bros. Inc., 128 North Wells street, has been incorporated to manufacture combustion machinery and equipment, power plant equipment, and coal, oil and gas burning furnaces and boilers, by James A. Mulligan, Thomas J. Finnegan and William V. Maina. Correspondent: Charles C. Elias, 33 North LaSalle street.

GRIGGSVILLE, ILL.—City has PWA loan of $90,000 for erection of waterworks.

PLANO, ILL.—Plano Foundry Co. recently sustained slight damages by fire.

POLO, ILL.—City has received PWA loan of $36,000 for sewage disposal plant.

SALEM, ILL.—PWA has allotted city $46,000 for extension to sewage treatment plant.

WARRENSBURG, ILL.—Village is planning construction of waterworks. Has federal loan of $36,000.

## District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will open bids Oct. 30, schedule 3571, on four electric portable pumps, delivery Sewall's Point, Va.

WASHINGTON—Chief, bureau of yards and docks, navy department, will receive bids Oct. 31, specification 7775, for 6000-kilowatt turbo-alternator and exciter at the navy yard, Philadelphia.

WASHINGTON—Bureau of supplies and acounts, navy department, will open bids Oct. 26, schedule 3481, on motor and turbine driven centrifugal pumps and spare parts and tools, schedule 3507, on 14 water turbine driven and gasoline pumps, delivery Brooklyn, N. Y.; Oct. 30, schedule 3509, motor generator equipments and spare parts, delivery f.o.b. contractor's works.

## Kentucky

FISHERVILLE, KY.—Bluegrass Distilling Co., Louisville, Ky., recently incorporated by W. L. McComas and associates, is planning to erect a plant here, with daily capacity of 23 barrels.

LEBANON JUNCTION, KY.—Board of trustees will receive bids until Oct. 29 for waterworks system, consisting of pumping machinery, pump house, filtration plant, and 75,000 or 100,000-gallon steel elevated tank.

LOUISVILLE, KY.—A. Markham & Co., 432 South Floyd street, has contract for construction of initial set of buildings for Stitzel-Weller Distillery, on Dixie Highway. Plant will consist of 500-barrel distillery, boiler plant and drying plant. Dr. William Lenz is consultant for the company.

## Louisiana

ALEXANDRIA, LA.—City, I. W. Sylvester, city engineer, has plans for $250,000 PWA power plant, including enlargement and improvement of municipal power plant. Bids for boiler will soon be called.

## Maryland

BALTIMORE—Gunther Brewing Co. Inc., 1211 South Conkling street, Charles H. Osborne, engineer, 222 West Franklin street, is planning to erect a warehouse, washing and packing building, 100 x 200 feet.

## South Carolina

GREENWOOD, S. C.—Greenwood county is applying for additional PWA funds to be added to its original allocation of $2,767,000 for power development on Saluda river.

## Missouri

FULTON, MO.—City has been allotted PWA loan of $98,500 for Butane air gas generating plant and distribution system.

INDEPENDENCE, MO.—Bids will be asked soon on steam power equipment for the proposed new municipal electric light and power plant, plans for which have been prepared by Black & Veatch, Mutual building, Kansas City, Mo. Equipment to be bought includes boiler feed pumps, air preheater and auxiliary equipment, piping and similar units. Fund of $140,000 is available through federal aid. (Noted Aug. 27.)

KANSAS CITY, MO.—Eagle Bottling

(*Please turn to Page* 79)

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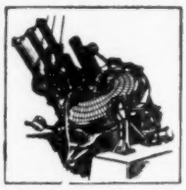

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322-S

(*Concluded from Page* 76)

Works, 1903 Cherry street, will build 4-story brewery to cost about $200,000. A. B. Anderson is architect and George Wentzel, engineer, both in Davidson building, Kansas City, Mo.

### Arkansas

CARLISLE, ARK.—Town has been allotted federal loan of $33,000 for sewage system and disposal plant.

DECATUR, ARK.—Town has received federal loan of $30,000 for waterworks system.

### Oklahoma

ARDMORE, OKLA.—City will take a vote Oct. 27 on $61,000 bonds for sewage disposal plant and filtration plant.

### Texas

DALLAS, TEX.—George W. Owens Lumber Co., George W. Owens Jr., president, will probably rebuild burned lumber plant at Commerce, Second, Canton and Trunk streets.

### Wisconsin

MILWAUKEE — Chicago, Milwaukee, St. Paul & Pacific railway has closed bids for construction of a new 1-story sandblast building, 27 x 102 feet, at its West Milwaukee car and locomotive shops here.

MILWAUKEE—Hermanson-Nortman Co. is the name of a newly-formed Milwaukee corporation which is opening a shop for the treating of metals at 401 South Seventh street. Sune Hermanson, 2189 North Fifty-second street, mechanical engineer; Arthur Davidson and Walter Nortman are the incorporators.

MILWAUKEE—Reliance Steel Erection Co. has been organized by W. C. Schmeling and H. C. Schmeling, long identified with the iron industry, to engage in the erection and repair of steel or iron structures, etc. Temporary quarters have been established at 4846 North Nineteenth street, Milwaukee.

NEILLSVILLE, WIS.—City plans construction of a municipal light and power plant. William Hemp is city clerk.

SHEBOYGAN, WIS.—Satre & Senescall, architects, are completing plans for a new $50,000 plant for the Modern Dairy Co operative, 65 x 80 feet, 2 stories, requiring some new machinery, tanks, piping, etc.

STOUGHTON, WIS. — Fairbanks, Morse & Co., Beloit, Wis., are low bidders for installing a new diesel standby unit in the city light and power plant here at $68,297. Capacity of the three engines specified will aggregate 800 to 900-horsepower.

### Minnesota

OWATONNA, MINN.—Northern Natural Gas & Pipe Line Co., affiliated with the Minneapolis Gas Light Co., Minneapolis, has plans for a welded pipe line from Rosemount to Mendota, Minn., including booster and distributing service, at cost of $1,200,000. A. F. Traver is company engineer.

ST. CLOUD, MINN.—Special election will be held soon on an issue of $1,249,000 of bonds for a municipal electric light and power plant and distributing system on plans by Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo.

### North Dakota

CENTRAL CITY, S. DAK.—Black Hills Brewing Co., J. F. Davis, president, will start construction early in November on a brewery of 75 barrels per day capacity. The company is incorporated with $150,000 capital.

LISBON, N. DAK.—City has rejected all bids received Oct. 1 for a 150,000-gallon steel water tank and new bids will probably be taken later. W. R. Sandager is city auditor.

WATFORD CITY, N. DAK.—City has been allotted funds by PWA for a municipal waterworks system, including pumping plant, steel water tank and distribution system.

### Iowa

DUBUQUE, IOWA—Chicago, Milwaukee, St. Paul & Pacific railroad has reopened its car repair shops, practically closed for several years, and has given employment to about 60 men. It is expected that many more men will be added later.

WATERLOO, IOWA—Rath Packing Co. has awarded contract for construction of an addition to its power plant to cost $90,000, including 536-horsepower boiler and other power plant equipment.

### Nebraska

NORFOLK, NEBR.—City is making plans for an electric light and power plant and distributing system. Black & Veatch, 700 Postal building, Kansas City, Mo., are engineers.

OMAHA, NEBR.—Creighton university, Rev. Patrick J. Mahan, president, is having plans prepared for a light and power plant to include complete equipment for generating light and power for needs of the university. Leo A. Daly, 622 Insurance building, Omaha, Nebr., is architect.

### Colorado

COLORADO SPRINGS, COLO.—City, E. Mosley, manager, plans a sewage disposal plant to cost about $200,000. Special election in spring will vote on bonds.

CREEDE, COLO. — Creede Custom Mill & Mines Inc. has announced that a 200-ton per day mill, using the amalgamation, concentration, flotation and cyanidization processes is under consideration, to be financed by unstated backers. This district is a rich silver belt.

RIFLE, COLO.—City plans an election on issue of $70,000 in bonds for a diesel power plant for which PWA funds have been allotted. E. Harrison Thwaits, 357 Lafayette street, Denver, is engineer.

### Wyoming

YELLOWSTONE PARK, WYO. — United States national park service has been allotted funds for construction of central water supply system and for purchase of three gas-driven water pumps.

### Arizona

TUCSON, ARIZ.—PWA has allotted $815,000 to the board of regents, University of Arizona, Tucson, Ariz., for construction of various buildings and erecting steel water tower.

### Pacific Coast

CLARKSBURG, CALIF. — Amalgamated Sugar Co., Ogden, Utah, plans to construct a sugar refinery at a site to be chosen near Clarksburg. A 350,000-bag capacity warehouse, process building, lime kiln, raw beet and lime rock storage house, main factory building, power plant and machine shop will be erected at a cost of $1,500,000. A. J. Forbes is chief engineer for the company.

SACRAMENTO, CALIF.—Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., has completed its report and will start plans for a power plant to supply electricity to the Sacramento valley, at cost of $20,000,000.

STOCKTON, CALIF.—Pacific Can Co., 290 Division street, San Francisco, which plans construction of a canning and can-making plant on a 20-acre site in the industrial area, is an independent concern having no connection with Wheeling Steel Corp., Wheeling, W. Va., as previously announced. Plans are by Ellison & Russell, Pacific building, San Francisco. (Noted Oct. 8.)

MT. VERNON, WASH.—John M. Henry, president, San Juan Island Canneries, Friday Harbor, Wash., announces plans for building next year a two-line pea cannery here, for which the local chamber of commerce has furnished a site.

PULLMAN, WASH.—Board of trustees of the University of Washington will ask bids soon for equipment for the proposed power plant for central steam heating, including boilers and accessories, feed water treatment devices, conveying equipment, fans, ducts and switchboards. Powerhouse will be 60 x 100 feet. Ross B. Hammond Inc., Spalding building, Portland, Oreg., has made low bid for building. Fund of $142,000 is available through federal aid. Stanley Smith, Pullman, Wash., is architect.

SEATTLE—Boundary Gold Placers Inc. has been incorporated with $750,000 capital by M. G. Phillips, 1331 Third Avenue building.

SEATTLE—Industrial Products Co., 2911 First avenue, South, has been incorporated with $10,000 by C. M. Rogers and associates, to engage in engineering and construction.

SEATTLE—H. T. Condon, secretary, University of Washington, 1030 Henry building, will receive bids Oct. 29 for furnishing lighting fixtures and finish hardware for the university library extension. Plans by Bebb & Gould, architects, Hoge building, Seattle.

### Dominion of Canada

WINNIPEG, MAN.—Bids will be received until Oct. 29 by chairman of public utilities, at office of M. Peterson, city clerk, for valves for waterworks department of the engineering department.

GODERICH, ONT.—Goderich Mfg. Co., William Baechler, manager, plans to rebuild its powerhouse, saw-setting rooms and two kilns, recently burned, at cost of $25,000. It asks prices on new equipment.

TORONTO, ONT.—Units in the city's $14,000,000 duplicate waterworks system have been completed to the extent of $7,000,000 and additional units to cost $4,000,000 will be started next spring. R. C. Harris, city hall, is commissioner of public works.

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